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Research Report

An evaluation of three restraining devices for capturing pampas foxes

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Abstract

Restraining is essential to many wildlife research and management programs. In an Argentine Pampas area, we studied the trapping success for the pampas fox *Pseudalopex gymnocercus*. We compared the capture efficiency (captures/trap days), species selectivity (fox captures/all captures), trap reliability (fox captures/fox visits), and malfunction rate (disturbed traps/trap days, of three restraining devices with different baits. In 3,495 trap days, we made 60 captures of 34 foxes and 13 other carnivores. Trapping rate differed from expected based on trapping effort, but efficiency varied little between traps, particularly between neck snares and foot-hold traps, while box traps proved less effective. Neck snares were the most selective devices, while live-baited foot-hold traps were the most reliable trap/bait combination. The lowest rate of malfunction was provided by the box trap/live bait combination. We suggest that bait type should be accounted for when evaluating trap performance.

Introduction

In many cases, restraining is necessary to study and manage wildlife, especially carnivores, which are cryptic and often occur at low population densities. The pampas fox is a medium-sized canid (2.5-8kg) occurring from Bolivia, Paraguay and southern Brazil to the Argentina provinces of Buenos Aires, La Pampa and Neuquén (Redford and Eisenberg 1992, Lucherini *et al.* in press). It is one of the most common and widespread carnivores within its geographic range, where it mainly inhabits grasslands and open woodlands. Although it is one of the most intensively harvested mammals in Argentina (Mares and Ojeda 1984), the pampas fox has been rarely studied.

The most desired features of restraining devices are: minimal stress, efficiency, selectivity and low injury risk. Only a few studies have tested these trap performances while capturing terrestrial carnivores, and almost all of them focused on North American and European species (Hubert *et al*. 1996 for raccoons *Procyon lotor*; Phillips and Mullis 1996, and Hubert *et al*. 1997 for coyotes *Canis latrans*; Travaini *et al*. 1996 for European red foxes *Vulpes vulpes*; Blundell *et al*. 1999 for river otters *Lutra canadensis*). In Doñana National Park, Spain, 23.9 trap nights were needed to trap red foxes with padded foot-hold traps, which proved remarkably selective because only 12 other carnivores, in comparison to 57 foxes, were trapped (Travaini *et al*. 1996). No data are available on restraining of any of the three most common South American foxes (pampas, chilla *Pseudalopex griseus*, and crab-eating fox *Cerdocyon thous*, foxes) (Redford and Eisenberg 1992).

We studied trapping success for pampas foxes restrained in padded foot-hold traps, box traps and neck snares (Figure 1). We compared capture efficiency, rate of escape and malfunction, and species selectivity of these restraining devices and of live and dead baits. We also tested for differences between first captures and recaptures in trap success. A manuscript comparing the injury risks of these three restraining devices is presently in preparation (E. Luengos *et al*. unpubl.).

Study area

We conducted our research on pampas foxes in two areas of the Ernesto Tornquist Provincial Park (about 38°00'S - 62°00'W), Buenos Aires Province, central Argentina. The Park is located within an isolated mountain range, which reaches 1,240m above sea level (a.s.l.). The dominant vegetation community is grassland (*Stipa*, *Piptochaetium*, *Briza*, *Festuca*), with sparse shrubs. Where soils are thin, shrubs (*Eupatorium* and *Discaria*) tend to predominate. Climate is temperate, with most precipitation occurring in spring and, to a lesser extent, in summer.

Figure 1. Pampas fox trapped in a box-trap in the Tornquist Park, Argentina.

Annual rainfall ranges from 500 to 800mm. Mean temperatures range between 29.8 and 2.9°C (Frangi and Bottino 1995).

We confirmed the presence of five carnivores for the area of Tornquist Park: the lesser grison *Galictis cuja*, common hog-nosed skunk *Conepatus chinga*, pampas fox, Geoffroy's cat *Oncifelis geoffroyi*, and puma *Puma concolor*. No information is available on the densities of these carnivore populations.

The two study areas are 5km apart, and differ in intensity of cattle grazing. While a rather dense population of feral horses is present in the Sismografo (SIS) area, no large herbivores occur in La Toma (LT).

Methods

We live-trapped carnivores from December 1998 to January 2000, totalling 123 days. In each season (summer: December 1998 - February 1999 and December 1999 – January 2000; autumn: April - June 1999; winter: July - August 1999; spring: September - November 1999) we conducted a trapping session in each study area. Trap setting was jointly carried out by the first two authors. E.L.V. was trained by M.L., who, in turn, had previous extensive experience on restraining European red foxes and wild cats *Felis silvestris*. At both trapping sites, we set the following three models of restraining devices: (1) 1.5 Victor Soft-catch® foot-hold traps. In order to reduce injury risks, these padded foot-hold traps were modified by wrapping each jaw in an additional rubber layer (McKenzie 1993). The swivel of these traps was anchored with a 30cm, iron stake driven into the ground. (2) Stop-integrated locking neck snares, which we built on the basis of a model successfully used in a study on the red fox in Italy (e.g. Cavallini and Lovari 1991, Lucherini *et al*. 1995). The snare was attached to the same type of stake used for the foot-hold traps. A swivel (which allowed for rotational movements) was inserted at about 20cm from the stake. Snares were set along corridors among tall grasses, and kept in position by means of a thin wood-stick. Neck snares were used as restraining devices rather than killing traps, due to the stop we added to them. The pampas fox neck circumference ranges from 20–28cm (Luengos Vidal and Lucherini, unpubl. data) so the stop was set at 30cm. (3) Iron mesh-wire box traps (40x40x120cm, width, height and length, respectively), which were custom-built on the basis of the most common commercial box trap designs with a single spring loaded falling door that was released by depressing a metal pan on the floor of the trap. We baited traps with chicken meat or live chickens *Gallus domesticus*, doves *Columba livia*, and domestic rabbits *Oryctolagus cuniculus*. With respect to most other mammal trapping studies (ASM 1998), we decided to increase the trap checking frequency to four times per day (at dawn, midday, dusk, and midnight) to reduce the risks of thermic stress (hypothermia in winter nights and hyperthermia in summer) and injury related to a prolonged struggle.

Trapped carnivores were immobilised with an intramuscular injection of Zoletil® (tiletamine hydrochloride-zolazepam hydrochloride, 5.74 ± 1.77mg/kg) or a mixture of ketamine hydrochloride (11.6 ± 3.7mg/kg) and xylazine hydrochloride (1.2 ± 0.4mg/kg). Both combinations have been widely recommended and documented for a number of carnivores and are characterised by a high therapeutic index (e.g. Maddock 1989, Travaini *et al*. 1992, Travaini and Delibes 1994, Beltrán and Tewes 1995, Larivière and Messier 1996). Drug dosages varied with species, following suggestions of Kreeger (1997). In almost all cases, animal handling was carried out with the collaboration of a wildlife veterinarian, under the supervision of M. Uhart (Field Veterinary Program, Wildlife Conservation Society, USA). We ear-tagged and released all individuals at the capture site after their complete recovery. Age class was estimated on the base of dentition deterioration (Crespo 1971).

We used the following indices to compare performances of restrain devices and baits: (1) capture efficiency (captures/100 trap days), a relative index of the trapping effort required to catch a given number of animals; (2) species selectivity (fox captures/all captures), which provides a measure of trap suitability for capturing foxes; (3) trap reliability (fox captures/total fox visits, where a fox visit is detected by the finding of fox spoor or a captured fox), a measure of the rate of escape of the target species, which also accounts for the different difficulty of setting each trap model; (4) malfunction rate (disturbed traps/100 trap days, where disturbed traps include traps disturbed that failed to fire and traps fired that failed to definitely catch an animal), which gives an indication of the amount of trapping effort required to keep the trap line working (Skinner and Todd 1990). Trapping sessions (n=9) were used as sample units in the Chi-square efficiency tests. Despite the fact that capture efficiency indices are widely used (Mowat *et al.* 1994, Travaini *et al.* 1996), they do not account for trapping effort. Therefore to compare between restraining devices, we used trapping effort to compute expected trapping frequencies for each trap/bait combination. This enabled us to test whether observed capture frequencies differed from expected and also to compute a simple preference index, which estimates the difference between observed and expected capture frequencies. The values of this index range from –1 (strong avoidance) to 1 (strong preference), while 0 indicates no difference between expected and observed efficiency. All aspects of restraining procedures were authorized by the Protected Areas Office of the Buenos Aires Province *Ministerio de Asuntos Agrarios*, which was in charge of all the activities concerning provincial wildlife and protected areas.

Results

Total trapping effort (trap days) varied for each kind of trap/bait combination (Table 1). We trapped for 3,495 trap days (Table 1) and captured 47 individual carnivores, belonging to all four small-medium-sized species occurring in the study area, a total of 60 times.

Thirty-four foxes were captured one to five times, 39 in SIS and 21 in LT. We also caught three Geoffroy's cats, five common hog-nosed skunks, and five lesser grisons (Table 2). In both areas, fox trapping efficiency varied seasonally and peaked in winter (ANOVA: $F_{3,36}$=4.09, P=0.013; Figure 2). Foot-hold traps and neck snares had similar efficiency for capturing foxes (χ^2 =0.06, P=0.81), while box-traps were less efficient (box vs. snare: χ^2=19.9, P=0.0001; box vs. foot-hold: χ^2=17.9, P=0.0001; Table 3). A local variation in efficiency between areas also was apparent (T-test: t_{19}: t= 2.14, P=0.046), with the only exception of spring (Figure 2), which may explain why the differences between seasons were significant in the SIS area (ANOVA: $F_{4,10}$=12.16, P= 0.0007), but not in LT (ANOVA: $F_{3,8}$=3.73, P= 0.061).

Non-target animals (n=17) captured included eight armadillos *Chaetophractus villosus*, one small rodent *Oxymicterus spp.*, one large iguana *Tupinambis teguixin*, and seven birds.

Table 1: Trapping effort for all trap/bait combinations we tested on pampas foxes in the two study areas of the Tornquist Park, Buenos Aires Prov., Argentina, from December 1998 to January 2000.

Trap/bait combinations	**Sismografo n (%)**	**La Toma n (%)**	**Total n (%)**
Foot-hold/meat	536 (35.8)	800 (40.1)	1,336 (38.2)
Foot-hold/live	148 (9.9)	277 (13.9)	425 (12.2)
Box/meat	202 (13.5)	135 (6.8)	337 (9.6)
Box/live	195 (13.0)	228 (11.4)	423 (12.1)
Snare	417 (27.8)	557 (27.9)	974 (27.9)
Total	**1,498 (100.0)**	**1,997 (100.0)**	**3,495 (100.0)**

Table 2. Total number of restrained carnivores (percentage) in the two study areas of the Tornquist Park, Buenos Aires Prov., Argentina, from December 1998 to January 2000.

Carnivores	**Sismografo n (%)**	**La Toma n (%)**
Pseudalopex gymnocercus	32 (53.3)	15 (25.0)
Conepatus chinga	2 (3.3)	3 (5.0)
Galictis cuja	4 (6.7)	1 (1.7)
Oncifelis geoffroyi	1 (1.7)	2 (3.3)

Table 3. Overall comparison between restraining device performances for capturing pampas foxes in the Tornquist Park, Argentina.

	Trap performance characteristic			
Trap	**Efficiency** (captures/100 trap days)	**Selectivity** (fox captures/all captures)	**Reliability** (fox captures/total fox visits)	**Malfunction** (disturbed traps/100 trap days)
Foot-hold	1.48	0.61	0.57	8.61
Box	0.79	0.32	0.50	4.08
Neck snare	1.54	1.0	0.33	2.83

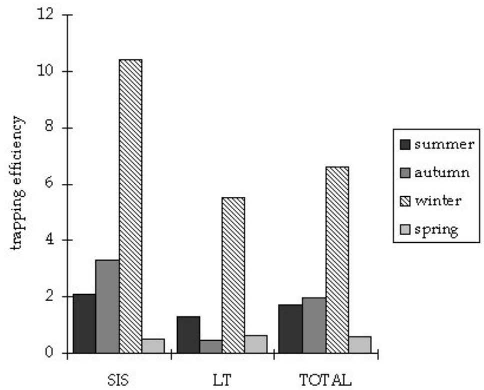

Figure 2. Number of pampas foxes trapped per 100 trap days by all three restraining devices by season and area (SIS and LT), in the Tornquist Park, Argentina.

Snares proved more selective than other restraining models to capture foxes, but less reliable (i.e. a fox entering a neck snare had a higher probability of escaping, Table 3). Foot-hold traps were disturbed two or three times more frequently than box and snare traps, respectively (index of malfunction, Table 3). Most foxes were first trapped in foot-hold traps, but were most frequently recaptured in neck snares (χ^2=8.2, P=0.017, Figure 3). On the other hand, the trap model where a fox was first trapped seemed to influence on the probability of recapturing that fox: 33.3% of six individuals trapped with box traps were recaptured, while these figures were 23.8% (n=21) and 14.3% (n=7), respectively, for foot-hold and neck snare traps. While snares appeared to be particularly effective with subadult foxes (50% of all trapped subadults), most adults (61.5%) were caught in foot-hold traps, but this difference was not significant (χ^2=2, P=0.158). We trapped all other carnivores in foot-hold (69%) and box (31%) traps. However, when accounting for their respective trapping effort, efficiency of these traps did not differ (foot-hold: 0.51; box trap: 0.53).

Foot-hold trap/meat was the most efficient trap/bait combination for capturing foxes, followed by meat baited snares (Figure 4). Overall, the trapping success of the different trap/bait combinations was different to expected on the basis of effort (χ^2=15.5, d.f. =4, P=0.004). However, a low degree of preference was detected, when comparing the specific trapping success and effort of each combination. For foxes, meat baited foot-hold trap was the only set where a slight positive difference was found between observed and expected capture frequencies, while the values of all other combinations indicated no preference (Table 4).

Neck snare/meat was the most selective combination for capturing *P. gymnocercus*, but the variations in the values of the species selectivity index was very low. The last two indices showed that snares proved to be the most difficult trap to use, since they were the least reliable and, together with meat-baited boxes, the most frequently sprung traps. The foot-hold/live bait combination was reliable, since every firing captured a fox. Finally, live baited traps (particularly box-traps) had the lowest malfunction rate (Figure 4).

Discussion

Restraining for research is a controversial subject that deals with the essence of animal welfare. Nevertheless, since, in many cases, restraining still is a necessary research tool, the delicateness of this issue does not reduce the need of detailed evaluations. While neck snares are widely used by trappers to lethally capture coyotes, grey wolves *Canis lupus* and red foxes (Phillips 1996), and have successfully been used for restraining red fox (Lucherini and Lovari 1996), foot-hold traps are by far the most commonly used device to restrain canids (Payne 1980, Linhart *et al*. 1986). In our study area foot-hold traps were similar to neck snares for capturing pampas foxes. The capture-recapture comparisons suggest that foxes actively avoided neck snares once they had been exposed to them even though neck snares are less conspicuous, and probably less easily detected. If this is true, one would also expect snares to prove the most efficient model. As expected, snare efficiency was the highest. However, when accounting for bait type, snares were slightly less efficient than foot-hold traps when similarly baited. This difference may be related to the low reliability of snares:

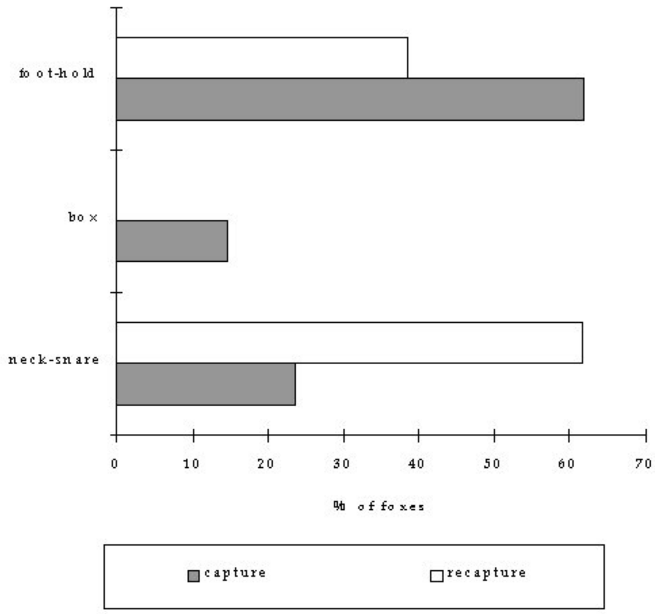

Figure 3. Differences in the proportions of Pampas fox captures and recaptures with each trap model (n = 47) in the Tornquist Park, Argentina.

Table 4. Trapping success (% of captures) and pampas fox and other carnivore preference for a given trap combination, in the Tornquist Park, Argentina. Preference is the difference between observed and expected capture frequencies. The values of this index range from –1 (strong avoidance) to 1 (strong preference), while 0 indicates no difference between observed and expected frequencies.

			Preference	
Trap/bait	**% Fox captures**	**% Carnivore captures**	**Fox**	**Carnivores**
Foot-hold/meat	51.1	61.5	0.128	0.233
Foot-hold/live	4.3	7.7	-0.079	-0.045
Box/meat	8.5	23.1	-0.011	0.134
Box/live	4.3	7.7	-0.078	-0.0044
Snare/meat	32.0	0.0	0.041	-0.279
			0.338*	0.735*

neck snare setting is sometimes difficult and time consuming, and they frequently fail to definitively trap the animal that trips them. When restraining foxes, drawbacks of snares are compensated by their high selectivity (no non-target animals were trapped in neck snares) and little effort required to keep them functioning. Foot-hold traps are efficient and flexible devices and can be easily set in many different field conditions. The main fault we detected for foot-hold traps was their relatively higher malfunction rate. These traps were often found disturbed and hence required frequent re-setting. Foot-hold traps also captured non-target species more frequently than other devices. Because of the strength of their jaw closing mechanism, non-target species may experience higher rates of injuries (e.g. Hubert *et al*. 1996, Travaini *et al*. 1996) or death, particularly when species smaller than foxes are caught (Travaini *et al*. 1996). Our box traps did not prove effective for restraining foxes. They

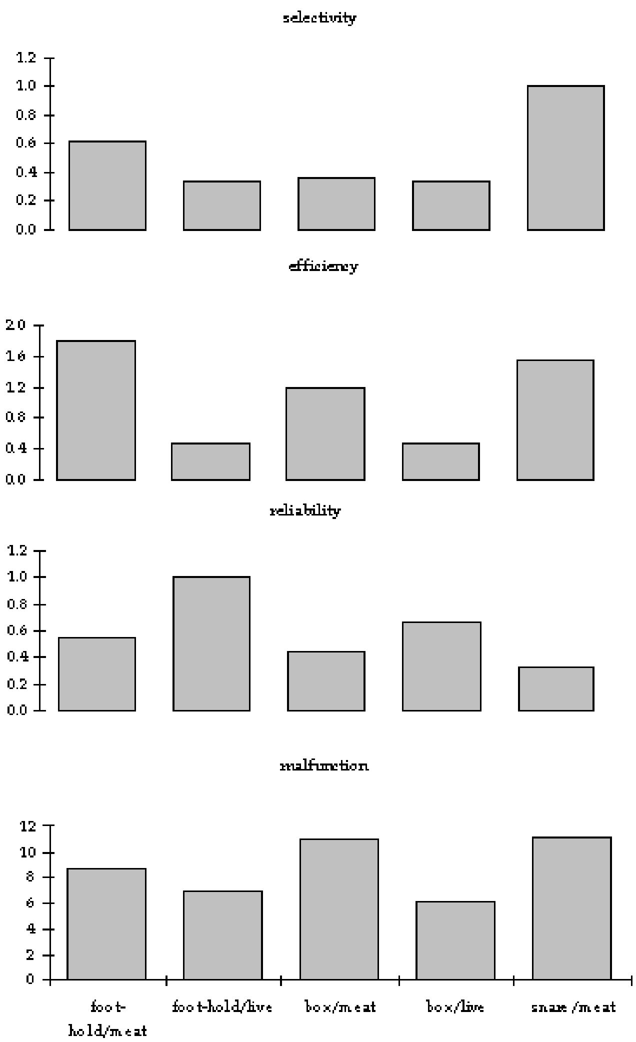

Figure 4. Performance of each trap/bait combination for trapping pampas foxes in the Tornquist Park, Argentina.

were neither efficient, nor selective, and had a rather high malfunction rate. Furthermore, they are heavier and more difficult to transport and set than the two other devices. The box trap's main advantage is that it offers the easiest option for using live-baits. It is likely that box traps would have performed better if used to capture carnivores that do not usually adopt scavenging (e.g. most felids, Kruuk 1986). Typically, foxes are generalist carnivores and our preliminary scat analysis showed that pampas foxes frequently eat carrion in our study area (unpubl. report). However, it cannot be dismissed that a different, box-trap model may have resulted in better performances.

Live-baits seemed to increase the fox capture rate, probably through a decrease in trap malfunction rate. Nevertheless, live-bait resulted in lower efficiency and selectivity of both box and foot-hold traps. Based on the results reported here, we suggest that trapping efficiency can be improved using a combination of box-traps and foot-holds. Since carnivores, especially foxes, frequently tried to get access to the live bait without entering the box-trap, foot-hold traps can be set around it. This strategy would additionally enable the use of the same bait for a higher number of traps.

Our results suggest that caution must be used when interpreting comparisons on trap efficiency. First, bait type must be accounted for, since it has been shown that, in carnivores, palatability may vary among baits (Polanen Petel *et al.* 2001), and this, in turn, can affect trapping efficiency. Secondly, we suggest that researchers should test for trap preference, comparing observed to expected capture frequencies, when evaluating trapping efficiency. For instance, our analysis showed that restraining devices performed differently from expected based on trapping effort, but also that the difference was minimal.

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References

American Society of Mammalogy. 1998. Animal care and use Committee. Guidelines for the capture, handling, and care of mammals as approved by the American Society of Mammalogy. *Journal of Mammalogy* 79:1416-1431.

Beltrán, J.F. and Tewes, M.E. 1995. Immobilization of ocelots and bobcats with ketamine hydrochloride and xylazine hydrochloride. *Journal of Wildlife Disease* 31:43-48.

Blundell, G.M., Kern, J.W., Bowyer, R.T. and Duffy, L.K. 1999. Capturing river otters: a comparison of Hancock and leg-hold traps. *Wildlife Society Bulletin* 27:184-192.

Bubela, T, Bartell, R. and Müller, W. 1998. Factors affecting the trappability of red foxes in Kosciusko National Park. *Wildlife Research* 25:199-208.

Cavallini, P. and Lovari, S. 1991. Environmental factors influencing the use of habitat in the red fox, *Vulpes vulpes*. *Journal of Zoology, London* 223:323-339.

Crespo, J.A 1971. Ecología del zorro gris *Dusicyon gymnocercus antiquus* (Ameghino) en la provincia de La Pampa. *Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Ecología* 1:147-205.

Frangi, J.L. and Bottino, O.J. 1995. Comunidades vegetales de la Sierra de la Ventana, Prov. de Bs. As., Argentina. *Revista Argentina de Agronomía La Plata* 71:93-133.

Hubert, G.F. Jr., Hungerford, L.L., Proulx, G., Bluett, R.D. and Bowman, L. 1996. Evaluation of two restraining traps to captured racoons. *Wildlife Society Bulletin* 24:699-708.

Hubert, G.F. Jr., Hungerford, L.L. and Bluett, R.D. 1997. Injuries to coyotes capture in modified foothold traps. *Wildlife Society Bulletin* 25:858-863.

Kreeger, T.J. 1997. *Handbook of Wildlife Chemical Immobilization*. 3rd edition. Wildlife Veterinary Pharmaceuticals Inc., Colorado.

Kruuk, H.H. 1986. *Interactions between Felidae and their prey species: a review*. Pp 353-374 in S.D. Miller and D.D. Everett (eds.), Cats of the World: Biology, Conservation and Management. National Wildlife Federation, Washington D.C.

Larivière, S. and Messier, F. 1996. Immobilization of striped skunks with Telazol®. *Wildlife Society Bulletin* 24:713-716.

Linhart, S.B., Dash, G.J., Male, C.B. and Engeman, R.M. 1986. Efficiency of unpadded and padded steel foothold traps for capturing coyotes. *Wildlife Society Bulletin* 14:212-218.

Lucherini, M. and Lovari, S. 1996. Habitat richness affects home range size in the red fox *Vulpes vulpes*. *Behavioural Processes* 36:103-106.

Lucherini, M., Lovari, S. and Crema, G. 1995. Habitat use and ranging behaviour of the red fox in a Mediterranean rural area: is shelter availability a key factor? *Journal of Zoology, London* 237:577-591.

Lucherini, M., Pessino, M. and Farias, A. *in press. Pseudalopex gymnocercus*. In C. Sillero-Zubiri, M. Hoffmann and D.W. Macdonald (eds.), Canids: Foxes, Wolves, Jackals and Dogs. Status Survey and Conservation Action Plan, Canid Specialist Group. IUCN, Gland and Cambridge.

Maddock, A.H. 1989. Anaesthesia of four species of viverridae with ketamine. *South African Journal of Wildlife Research* 19:80-84.

Mares, M.A. and Ojeda, R. 1984. Faunal commercialisation and conservation in South America. *Bioscience* 34:580-584.

Mc Kenzie, A. 1993. *The capture and care manual: capture, care, accommodation and transportation of wild African animals*. Wildlife Decision Support CC and The South African Veterinary Foundation, Pretoria.

Mowat, G., Slough, B.G. and Rivard, R. 1994. A comparison of three live capturing devices for lynx capture, efficiency and injuries. *Wildlife Society Bulletin* 22:644-650.

Payne, N.F. 1980. Furbearer management and trapping. *Wildlife Society Bulletin* 8:345-348.

Phillips, R.L. 1996. Evaluation of 3 types of snares for capturing coyotes. *Wildlife Society Bulletin* 24:107-110.

Phillips, R.L. and Mullis, C.M. 1996. Expanded field testing of the No. 3 Victor Soft Catch® trap. *Wildlife Society Bulletin* 24:128-131.

Polanen Petel van, A.M., Marks, C.A. and Morgan, D.G. 2001. Bait palatability influences the caching behaviour of the red fox (*Vulpes vulpes*). *Wildlife Research* 28:395-401.

Redford, K. and Eisenberg, J.F. 1992. *Mammals of the Neotropics*. The Southern Cone, Volume II. Chicago University Press, Chicago.

Skinner, D.L. and Todd, A.W. 1990. Evaluating efficiency of footholding devices for coyote capture. *Wildlife Society Bulletin* 18:166-175.

Travaini, A., Ferreras, P., Delibes, M. and Aldama, J.J. 1992. Xylazine hydrochloride-ketamine hydrochloride immobilization of free-living red foxes (*Vulpes vulpes*) in Spain. *Journal of Wildlife Disease* 28:507-509.

Travaini, A. and Delibes, M. 1994. Immobilization of free ranging red foxes (*Vulpes vulpes*) with tiletamine hydrochloride and zolazepam hydrochloride. *Journal of Wildlife Disease* 30:589-591.

Travaini, A., Laffitte, R. and Delibes, M. 1996. Leg-hold trapping red foxes (*Vulpes vulpes*) in Doñana National Park: efficiency, selectivity, and injuries. *Journal of Wildlife Research* 1:52-56.

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