Flashing lights to deter small stock depredation in communal farmlands of Namibia

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SUMMARY: Flashing lights can work as an effective visual deterrent to protect livestock in kraals at night against wild carnivores.

BACKGROUND

Non-lethal conflict mitigation strategies are key to promoting human-wildlife coexistence and a wide range of technical approaches exist (Breitenmoser *et al.* 2005, Littlewood et al. 2020). One of many techniques is the use of flashing lights as a visual repellent that may mimic human activity to deter wildlife. This technique has largely been proven effective in protecting livestock from depredation by carnivores at night (Lesilau *et al.* 2018, Ohrens *et al.* 2019, Okemwa *et al*. 2018, Naha *et al.* 2020, Sutherland *et al.* 2021, Wanjira *et al*. 2021). Yet without reinforcement with aversive human activity, such as lethal control, the efficacy of flashing lights as a visual deterrent may be limited (Hall & Flemming 2021). We investigated the effect of lights on small-stock (sheep/goats) depredation in communal livestock farmlands of eastern Namibia (S20.477837°, E18.309661°). The primary predators of small stock are black-backed jackal *Canis mesomelas* and caracal *Caracal caracal*, which are highly persecuted (Verschueren *et al.* 2020). This study increases the geographic scope of current knowledge and adds to the evidence base for using flashing lights as an effective method for reducing human-wildlife conflict.

ACTION

We selected five farmers who reported small-stock losses to carnivore attacks within kraals (12 m x 12 m enclosure). Kraaling is a culturally accepted method of livestock confinement at night to reduce carnivore conflict, yet size, shape and maintenance of kraals is important for their effectiveness (Weise et al. 2018). Reported losses were attributed primarily to jackal and infrequently to cheetah *Acinonyx jubatus*, that farmers were able to differentiate consistently based on bite marks on livestock, tracks and scat; as well as unknown carnivores that they were unable to identify. We equipped farmers with four Foxlights® (Bexley North, Australia), to place one on each side of the kraals (n = 5). Foxlights are solar-powered devices that emit randomly varying, flashing lights in three colours (red, blue, and green), with the light emission triggered by a sensor that detects darkness (Figure 1). At time of deployment, we recorded the number of small stock owned, the number of small stock lost to carnivores in the previous year, the location where the attack occurred (within kraal, < 15 m from kraal, > 15 m from kraal), and time when the attack occurred (day, night). One year after deployment, we conducted a follow-up survey asking the same questions. The study ran from December 2018 to December 2019.

Figure 1. Foxlight deployed on the fence of a kraal.

CONSEQUENCES & DISCUSSION

After the deployment of Foxlights, no livestock were lost to carnivores at night, inside the kraal, or within 15 m of the kraal during the study period (Table 1). Livestock losses away from the kraal were attributed to cheetah and serval *Leptailurus serval*, although the latter was most likely caracal being misidentified by farmers. Our results suggest that flashing lights could work as an effective visual deterrent to protect livestock in kraals against nocturnal carnivores. We left the Foxlights with the farmers and other farmers in the area have replicated the technique. This provides an opportunity for long-term monitoring of the effectiveness of flashing lights as previous studies found reduced effectiveness due to habituation and location shifts of conflict cases (Darrow & Shivik 2009, Lesilau *et al.* 2018). We recommend the use of flashing lights as part of a more complex and integrative livestock management plan that targets long-term human-carnivore coexistence.

Table 1. Summary of small-stock numbers before and after installation of Foxlights.

Treatment	Farmers with losses	Total small stock owned	Total small stock lost	Loss per farmer (± SD)	Location relative to kraal			Time	
					Inside	< 15 m	> 15 m	Day	Night
Before	5	338	36	7 (± 3)	25	5	6	11	25
After	2	385	15	3 (± 5)	0	0	15	15	0

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