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Source: Wildlife Biology, 19(3) : 325-334

Published By: Nordic Board for Wildlife Research

URL: https://doi.org/10.2981/13-036

Wildl. Biol. 19: 325-334 (2013)
DOI: 10.2981/13-036

www.wildlifebiology.com

Short communication

Corral mass capture device for Asiatic wild asses *Equus hemionus*

Vitaliy Fyodorovich Levanov, Sergey Vladimirovich Sokolov & Petra Kaczensky

Asiatic wild asses *Equus hemionus* are difficult to catch as most populations are subject to poaching and are thus very shy. Wild asses run fast and groups tend to split up when disturbed or chased. Free-range darting normally only allows the capture of single individuals, and the recommended anaesthetic protocol requires the use of the potent opiate ethorphine, which is highly toxic for humans and subject to special purchase and import regulations. In the following, we describe a corral capture method developed in Altyn Emel National Park in southeastern Kazakhstan. Round-ups of Asiatic wild asses were done at night by use of cars and strong lights to reduce the speed of fleeing asses by impeding their ability to see the terrain. The method provides an additional tool for capturing free-ranging wild asses, and contrary to previously described methods, it does allow the simultaneous capture of groups of animals without the need for chemical immobilisation.

Key words: Altyn Emel National Park, Asiatic wild ass, capture techniques, Equus hemionus, Kazakhstan

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Received 3 March 2013, accepted 24 April 2013

Associate Editor: Leif Egil Loe

Mass capture devices for large ungulates have been used by humans for millennia. In the open and arid landscapes of the Near East, ancient funnel-shaped constructions of low stone walls leading into a stone walled enclosure or pit (called 'desert kites'), were used by post-Neolithic societies as a mass-kill hunting strategy particularly targeting goitered gazelles *Gazella subguttorosa* but also Asiatic wild asses *Equus hemionus* (Bar-Oz et al. 2011). Rock engravings and historic accounts further support the use and efficiency of desert kite-like structures for the mass capture of different gazelles as well as wild asses in the Middle and Far East (Holzer et al. 2010) but also for other ungulates, e.g. wild reindeer *Rangifer tarandus* in northern Europe (Helskog 2011) and pronghorn *Antilocapra americana* in North America (Hockett & Murphy 2009).

In modern times, adapted corral systems for large herbivores have mainly been used for management purposes, e.g. for marking and sorting of semi-domestic reindeer in northern Europe (Helskog 2011), for removal of feral horses *Equus caballus* from public land in North America and Australia (Boyles 2007, Dobbie et al. 1993), and for shearing of wild vicuñas *Vicugna vicugna* in South America (Bonacic et al. 2006). However, the use of corral systems for research and conservation purposes has been rare or poorly described (Holzer et al. 2010).

The live capture of Asiatic wild asses is a challenge. Most populations are subject to poaching and are thus very shy (Kaczensky et al. 2006). Recently, Walzer et al. (2006, 2007) refined free-range darting methods for wild asses in Mongolia. Their method involved ambushing and darting wild asses at water points or darting from a pursuing jeep. Although the method proved safe for the animals (no animals were injured or lost in > 50 capture events), it can only be done on reasonably flat terrain, only a single animal

can be darted in every capture event and the recommended anaesthetic protocol requires the use of the potent opiate ethorphine (Walzer et al. 2006, 2007, Walzer 2007; Appendix I), which is highly toxic for humans and subject to special purchase and import regulations (Haymerle et al. 2010).

Interest in wild ass research and conservation is high in Asia, but experienced wildlife veterinarians are rare and access to recommended drugs for free-range darting is not readily available in several of the wild ass range countries (e.g. Iran, Kazakhstan and Mongolia). Furthermore, capture methods which allow for the simultaneous marking of entire groups could benefit studies on the social organisation of wild asses. In the following, we describe a corral mass capture device developed in Kazakhstan for live capture of Asiatic wild asses for translocation. By describing the experience from Kazakhstan, we aim to supplement the toolbox of methods available for the capture of free-ranging wild equids.

Material and methods

Study area

Our study area was located in the 5,200 km^2 Altyn Emel National Park (NP) in southeastern Kazakhstan. Its southern boundary is formed by the Illy river and the subsequent Kapchagai reservoir and its northern boundary is the Sholak mountain, a spur of the Dzungar Alatau mountain range. Elevations range from 500 to 2,900 m a.s.l., average annual temperature is 9.2°C and average annual precipitation is 633 mm. Wild asses were reintroduced into the area during 1982-1984. Currently, wild ass numbers in the area are estimated at 2,500 animals (Plakhov et al. 2012).

Wild asses in Kazakhstan

The Asiatic wild ass *Equus hemionus* (called 'kulan' in the Kazakh language) became extinct in Kazakhstan at the end of the 1930s due to overhunting and competition from livestock (Heptner et al. 1989, Moehlman et al. 2008). However, reintroductions already began in 1953 when eight wild asses from Turkmenistan were brought to the Barsa-Kelmes Island in the former Aral lake (Meldebekov et al. 2010). The population increased and provided the stock for further reintroduction initiatives to Altyn Emel NP (during 1982-1984 a total of 38 wild asses were released), Aktau-Buzanchy Sanctuary on the Buzashchy Peninsular (35 wild asses were released in 1991) and Andassay Sanctuary (60 wild asses were released during 1986-1990).

The newly established wild ass population in Altyn Emel NP grew rapidly, but the species status in the Andassay Sanctuary remained unclear (Meldebekov et al. 2010). Consequently, further releases were initiated in 2006, and it was anticipated to annually move 30-35 animals from Altyn Emel NP to the Andassay Sanctuary within in the framework of the governmental wild ungulate conservation programme. The large number of animals aimed to be transferred necessitated the development of new capture techniques. After some initial failures, a corral capture device was successfully utilised for the first time in 2006.

Capture corral

The corral trap was located between the Kapchagai

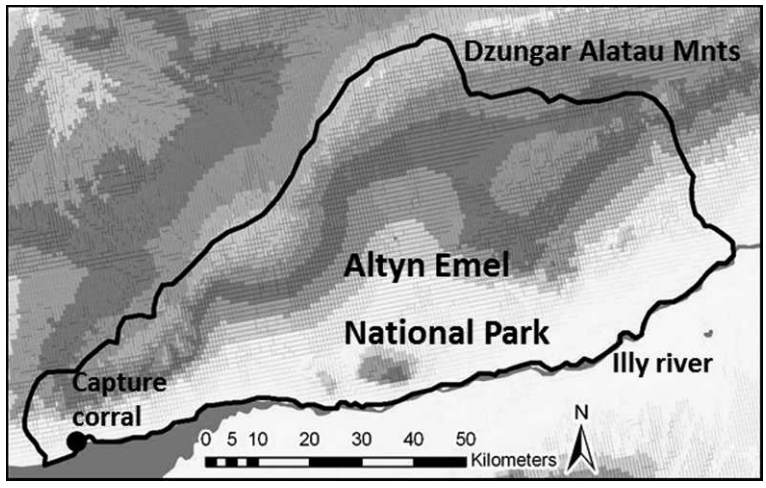

Figure 1. Study area in Altyn Emel National Park in southeastern Kazakhstan.

Table 1. Capture details from seven capture attempts using the capture corral chase method in Altyn Emely National Park in southeastern Kazakhstan during 2006-2011.

Year	#	Funnel design	Time	Drivers	Wild ass group size	Distance (km)	Animals captured ♂	♀	Foals	% of herd chased	Comments
2006	1	Symmetrical & straight	Day	14 cars, 5 horsemen	> 100	7-8	0	0	0	0	Too many cars; asses had full visibility of the terrain
	2	Symmetrical & straight	Night	5 cars	40-45	5-6	2	18	15	78-88	Panic at straight funnel entrance, was counterbalanced by additional cars
2010	3	Asymmetrical & bow shaped	Night	1 car	60	1	0	0	0	0	Asses close, but opposite to the funnel entrance; disturbance at gate made asses turn back
	4	Asymmetrical & bow shaped	Night	12 cars	~50	< 10	0	0	0	0	Problem of coordinating so many cars
	5	Asymmetrical & bow shaped	Night	3 cars	70	9-10	2	24	9	50	-
2011	6	Asymmetrical & bow shaped	Night	3 cars	45-50	15	1	1	6	16-18	Long chase distance and difficult terrain
	7	Asymmetrical & bow shaped	Night		45-51	20-25	3	7	17	60-68	Long chase distance resulted in separation of foals from mares
Total							8	50	47		

reservoir and the Sholak mountain providing a natural landscape funnel and built in a natural depression, making it largely invisible from a distance (Fig. 1). All corral captures were attempted in November when a portion of the wild ass population migrates to the western part of the Altyn Emel NP.

The initial corral design of 2006 had two symmetrical and straight 250 m long 'wings' meant to guide the asses into the corral (see Appendix I). Due to averse reaction of a wild ass group in 2006 (Table 1), the initial design was replaced in 2010 by an asymmetric bow-shaped funnel design (Fig. 2). The leading fence was about 200 m, consisting of chain-linked fence near the corral and a simple 3-strand wire fence (ø 6 mm) further away from the entrance; both supplemented with reflecting tape. A shorter 30 m straight arm of chain-linked fence funnelled the animals towards the open gates of the corral. The corral was 30-50 m in diameter and the surrounding chain-linked fence was covered with non-transparent plastic sheets to mimic a solid barrier and to reduce visual disturbance from human activity on the outside of the corral. A second gate, leading to a wooden chute allowed the funnelling of wild asses into individual transport boxes.

Kulan drive method

We only targeted wild ass groups within 25 km of the capture corral. Chase cars stayed within sight of the targeted group, but far enough away as not to disturb them. Except for one initial and unsuccessful daytime attempt, the round-up of the target group did not start before it was completely dark (see Table 1). A minimum of three cars was used with the car in the middle coordinating the activities of the other cars and the people at the corral via walkie-talkie. Immediately before the drive, the blinking lights at the outer ends of the short and long legs of the funnel fence were turned on so that the car drivers had a visual aid of where to drive the herd (see Fig. 2). The three cars drove parallel about 10-50 m behind the herd. The two cars on the flanks drove somewhat ahead, forming an 'arc'. With hand-held strong and focused searchlights, the two cars on the flanks created a 'light fence' stopping animals from breaking out to the sides, while the car in the middle used an unfocused searchlight aiming at the legs of the animals thus impairing their ability to see the terrain in front (see Fig. 2).

The speed of the round-up was moderate (30-40

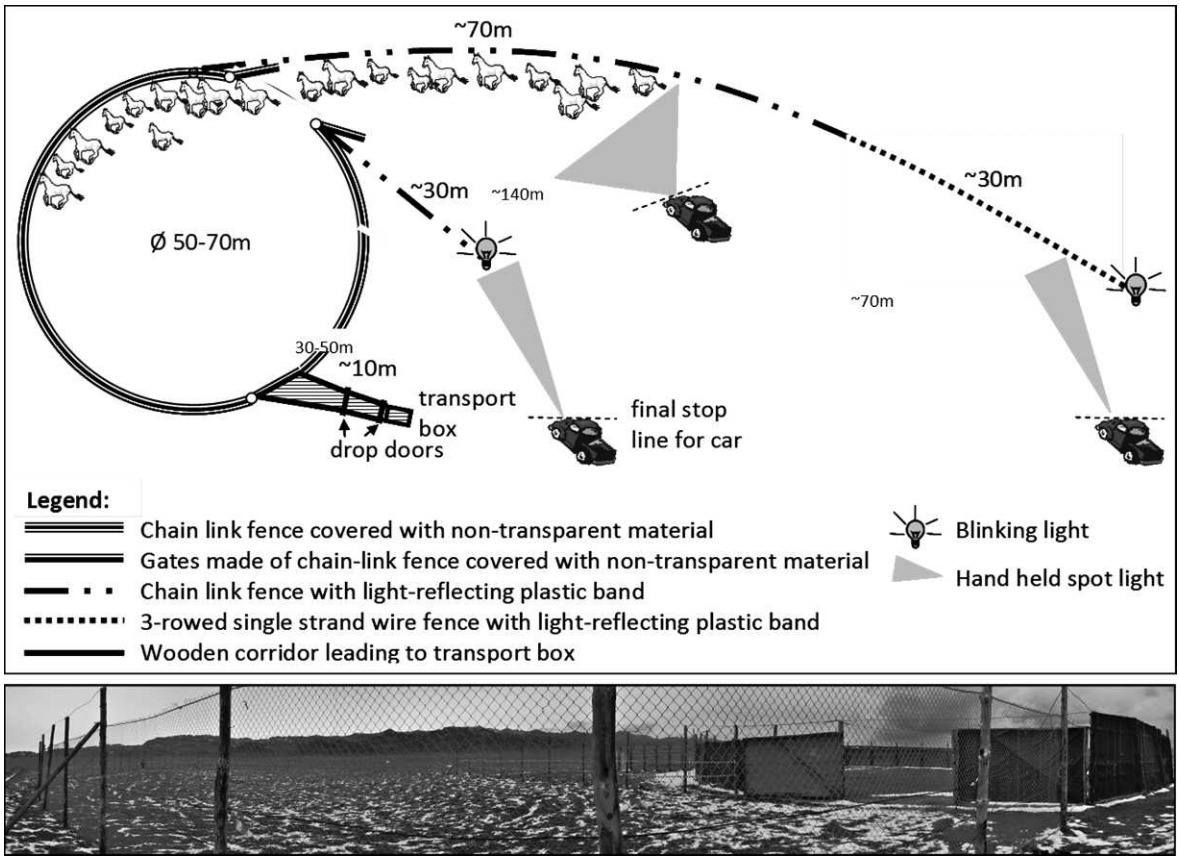

Figure 2. Corral trap for wild asses in Altyn Emel National Park in November 2011 (Photo: P. Kaczensky).

km/hour) on the first third of the drive, moderate to fast for the second third (40-60 km/hour) and very fast (60-70 km/hour) on the final third of the drive. Whereas the two cars on the flanks stopped about 5-10 m before the blinking lights, the middle car stopped when it reached the entrance of the final funnel (see Fig. 2). The gates of the corral were operated by two people remaining motionless and concealed behind them. Once all animals were in the corral, the gates were quickly closed and all activity was stopped and the animals were left alone to calm down. In the morning animals were given hay and water and were individually driven into the transport boxes (Appendix II).

Results

During 2006-2011, four out of seven different capture attempts were successful and resulted in the capture of 105 wild asses (see Table 1). No fatalities or injuries occurred.

The first capture attempt was done during the daytime using 14 cars (spaced 70-80 m apart) and five horsemen (spaced 30-50 m apart and located in barely passable areas with gullies and scrub) placed in an arc as an extension of one of the funnel wings. A large herd of wild asses located 7-8 km from the trap was slowly pushed towards the corral. However, a subgroup became nervous and subsequently the entire herd panicked and escaped through the line of horsemen and cars.

The second capture attempt was done at night using five closely coordinated cars with spotlights. A small herd of 40-45 animals was found at a distance of 5-6 km and chased by one car in the middle and two cars on each side. When the wild asses reached the entrance of the symmetric funnel design they stalled, but five additional cars joined in to chase them the final 250 m into the corral.

For the third capture, a new asymmetric bow-shaped funnel design was used (see Fig. 2). A herd of 60 wild asses was discovered one kilometre from the enclosure, but only one car was used for the chase.

Table 2. Different capture methods for free-ranging Asiatic wild asses in central Asia.

	Ambush*	Free-range chase*	Fixed corral
Requirements			
Terrain	Attraction point needed (e.g. water, food)	Flat, with little bush coverage for at least 10-15 km	Flat, with little bush coverage for 3 km around the corral
Weather	Not too windy as this greatly reduced accurate shooting distance	No snowfall, fog or heavy rain as this makes finding and following wild asses difficult	No snowfall, rain or fog as this blocks light beam at night
Time of the day	Depends on local activity pattern of wild asses; for night time captures transmitter darts and search lights will be needed	Day	Night
Time of the year	No restriction	Best in spring (before foals are born) or in winter (when foals are already large)	Best in winter (when foals are already large)
Maximal capture distance	40-55 m	Capture location flexible	$<$ 10 km
Equipment	Remote drug delivery systems, hide	Remote drug delivery systems, 1 sturdy 4-wheel drive vehicle with safety belts and rollover bars	Corral: pools, fencing, wire, visual barrier material, 2 blinking lights; Chase: 3 sturdy 4-wheel drive vehicle with safety belts and rollover bars, 3 strong hand-held search lights, communication equipment
Man power	Low; 2 people: shooter with dart gun and observer to keep track of darted wild ass	Low; 2 people: driver and shooter	High; multiple people: transport and set up corral, 3 drivers for chasing, 1-2 people at corral to operate gates
Anaesthesia necessary	Yes	Yes	Not required for capture and subsequent loading; necessary for radio-collaring
Training required	Experienced wildlife veterinarian for handling drugs	Experienced wildlife veterinarian for handling drugs, good shooter, excellent driver	Excellent coordinator and 3 good drivers for capture; an experienced veterinarian for handling drugs when wild asses are to be radio-collared
Risk for wild asses			
Retrieval of drugged wild asses	Wild asses may not be found as they normally take off after being hit by the dart	Darted wild asses are slowly followed by jeep - identifying and following the right ass is difficult when the ass is part of a large group and/or shed the dart	Guaranteed
Risk of separating foal from mare	Low; Foal follows darted mare and stays in the vicinity during handling	Moderate; foal may get separated from mare during high speed chase; mare will be able to search for foal 30-40 minutes following capture	High; At distances $>$ 10 km the chances for separation increase
Injury risk	Low; possibility of dart misplacement	Low; chase needs to be restricted to $\leq$15 minutes; possibility of dart misplacement	Low; possibility of intra-specific aggression in corral

Table 2. Continued.

	Ambush*	Free-range chase*	Fixed corral
Risk for capture team			
Injury risk	Low	High; possibility of whiplash injuries, drug related accidents (self administration, spilling) or car crash during high speed (50-70 km/hour) chase over unknown terrain	Moderate; possibility of car crash at night but high-speed part much shorter than during free range chase and better knowledge of terrain near corral
Damage to equipment	None	High; damage to car and capture equipment during high speed chase	Moderate; damage to car during night chase
Efficiency	Highly dependant on frequency of wild ass visits and wind regime; only single wild wild asses can be captured in one capture event	Highly dependant on wild ass encounter rate, terrain, and driving and shooting performance of capture team; only single wild asses can be captured in one capture event	Highly dependant on ass distribution relative to coral and coordination of capture teams; a whole group of wild asses may be captured in one capture event

* Bases on experience of the last-mentioned author from Mongolia and Iran and largely published in Walzer et al. (2006, 2007) and Walzer 2007.

However, the animals were located on the side opposite of the funnel and the single car was only able to turn eight asses towards the funnel entrance. In an attempt to help the single car, two people at the gate turned on a powerful flashlight and ran towards the wild asses, which made them turn and escape past the chase car.

In the fourth capture attempt, 12 cars were used but the capture failed due to the difficulties of coordinating so many cars.

For the fifth capture, three cars chased a herd of 70 wild asses from a distance of 9-10 km towards the trap. Thirty-five wild asses arrived at the wings of the trap, where two other cars joined the chase resulting in the capture of all remaining animals in the corral.

For the sixth capture, three cars chased a group of 45-50 wild asses from a distance of 15 km towards the trap. However, due to the long chase distance and the difficult terrain most animals escaped and only eight asses reached the corral.

For the seventh capture, three cars chased 27 wild asses out of a group of 40-45 wild asses from a distance of 20-25 km into the corral.

Discussion

The adapted corral capture method provided a relatively safe method for the live capture of groups of wild asses as neither animals nor people were injured. Round-ups at night with strong lights reduced the speed of fleeing asses by impeding their ability to see the terrain. The high speed chase only happened over the last $\sim$ 3 km and over terrain with which the team was already familiar. Free-range darting from a pursuing jeep, on the other hand, often necessitates speeds of $>$ 70 km/hour to catch up with a group and 60-70 km/hour to align with the targeted wild ass for free-range darting. The longer the high-speed chase, the more suitable chase habitat (flat and without high bushes) is needed and the higher the risk of hitting unexpected obstacles becomes, often resulting in car breakdowns (P. Kaczensky, pers. obs.).

The location of the capture corral in Altyn Emel NP seems ideal because it is within the early winter range of the wild asses in the park, and because it is located at a natural landscape funnel created by the Kapchagai reservoir and the Dzungar Alatau mountain range. The disadvantage is that the team had to wait for wild asses to come to the location and had little flexibility to react to changes in wild ass distribution. Ambushing and darting wild asses at water points or feeding sites is also a waiting game but due to the limited man power and equipment needed, there is more flexibility to react to changing opportunities (Table 2).

A quantitative comparison of the effectiveness, risks and costs of the corral capture with the two other methods documented for Asiatic wild asses (Walzer et al. 2006, 2007, Walzer 2007) is not possible as factors are highly dependent on the local situation

and the skills of the individual people involved. Consequently, the corral capture method should be seen as an additional method in the toolbox of potential capture approaches which all have their challenges (see Table 2).

The main advantage of the corral capture method over the ambush and free-range chase method is that it allows the simultaneous capture of a group of wild asses and does not require the animals to be anaesthetised (see Table 2). Whereas wild ass groups disturbed or chased during daytime tend to split up quickly, the night time chase seems to allow holding groups together for longer. But even at night time, there are limits and round-ups of large groups over longer distances resulted in adult asses escaping more frequently than young ones (e.g. during the sixth capture, we primarily captured foals). The predominance of young animals likely reduced the potential for interspecific aggression and thus the risk of injury, but also separated several foals from their mothers. If wild asses are captured with the goal of establishing a captive group, it may be an advantage to capture young animals as they are more likely to adapt to captive conditions and less likely to fight. However, for reintroduction or restocking initiatives, yearlings and foals without mares may face high mortalities as they are the least experienced section of the population and generally the most vulnerable to extreme conditions (Kaczensky et al. 2011).

In order to capture complete groups, the corral capture could be potentially further adapted by: 1) primarily rounding up small groups which should be easier to hold together, 2) only attempting round-ups when animals are within 3-5 km of the corral, or 3) coming up with a light-weight version of the present corral and fence system (e.g. use plastic pools and netting) that allows the trap to be quickly erected close to the targeted group. Light-weight adaptation will likely increase the costs, but in the long run would pay off as it would reduce the waiting time.

With the above-mentioned adaptations, the capture corral could allow for the capturing of seemingly stable groups of wild asses. This would for the first time allow the marking of all or most individuals of a social group and enable monitoring of group stability. The results could finally allow the development of a better understanding of wild ass social organisation, which remains largely unknown (Kaczensky et al. 2008, Moehlman et al. 2008, Sundaresan et al. 2007). However, radio-collaring animals should only be done using anaesthesia to reduce stress and risk of injury (Walzer 2007). Handling capture drugs in situations with corralled or boxed asses will be far safer than during high speed chases and would also allow for alternative anaesthetic protocols, not necessitating the use of etorphine (Walzer 2007).

Acknowledgements - we are thankful for support, experience and information provided by many people; the late Sludskiy Arkadiy Aleksandrovich (1912-1978) a pioneer of wild ass reintroduction in Kazakhstan; Musabayev Khairbek Shakhvaliyevich, Deputy Chairman of the Committee for Forestry and Hunting of the Republic of Kazakhstan, who helped with the allocation of state budgetary funds and with solving administrative problems from issuing capture permits, organising the cooperation with the territorial inspections of the Zhambyl and Almaty regions and Altyn Emel NP; Bayadilov Kalyk Ongarovich, Director of Altyn Emel NP, who provided us with means of transportation and organised for the park rangers to participate in the capturing of wild asses; Akylbekova Aigul Zhanysbekovna, Chief Engineer of the 'LLP Okhotproject', who provided technical assistance for the 2010-2011 capture programme. Former deputy director of science Rustam Habibrakhmanov, who provided further information on wild equid conservation in Altyn Emel NP; Zhanna Tulegenova, Association for the Conservation of Biodiversity of Kazakhstan (ACBK), for great company and interpreting in Altyn Emel NP in November 2011 and for English-Russian-English translation for the manuscript; Eva Klebelsberg and Orken Shaimukhanbetov, ACBK and Frankfurt Zoological Society (FZS), for logistical support and hospitality. Eva Klebelsberg and John D.C. Linnell provided valuable comments on an earlier draft of the manuscript.

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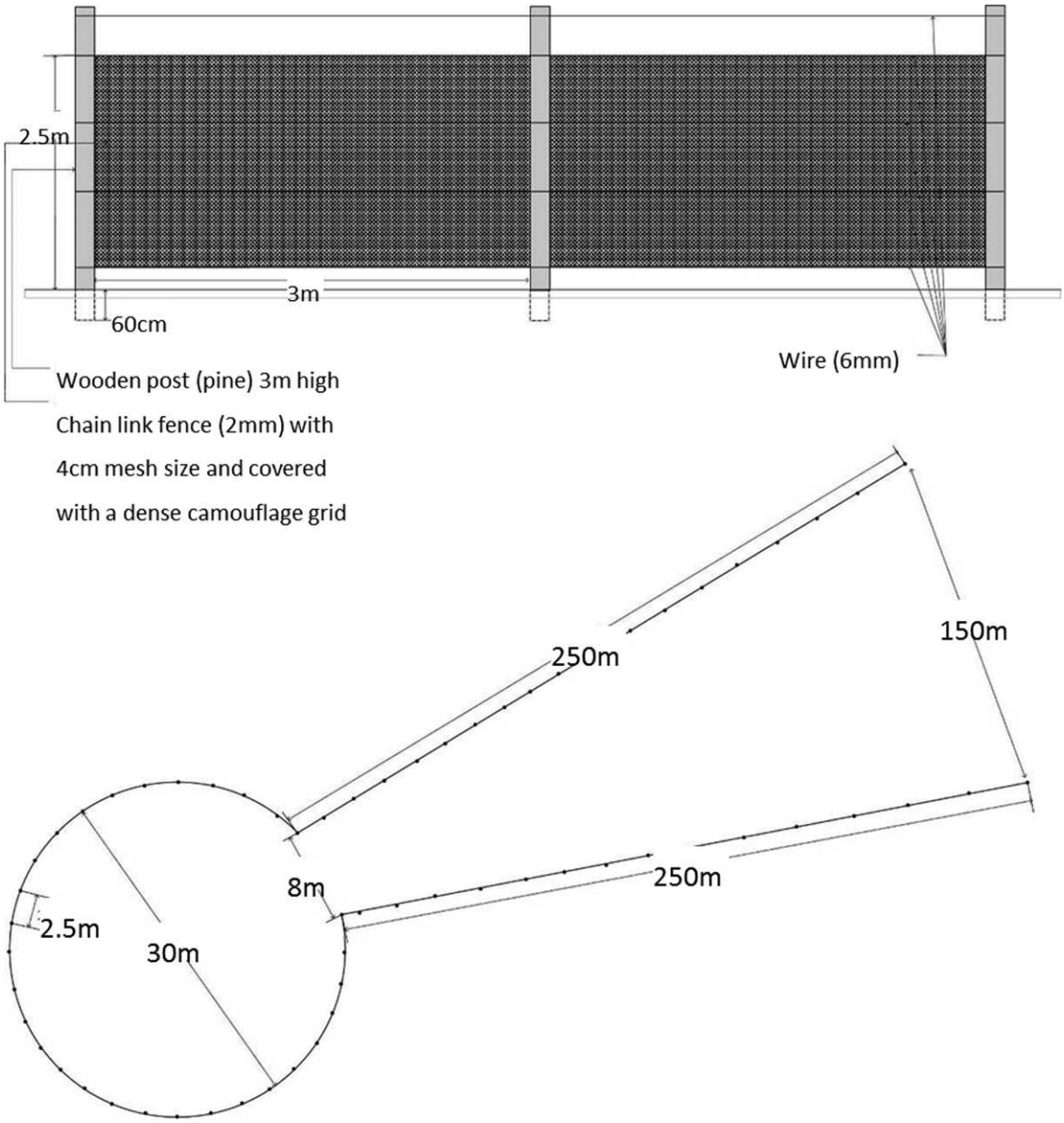
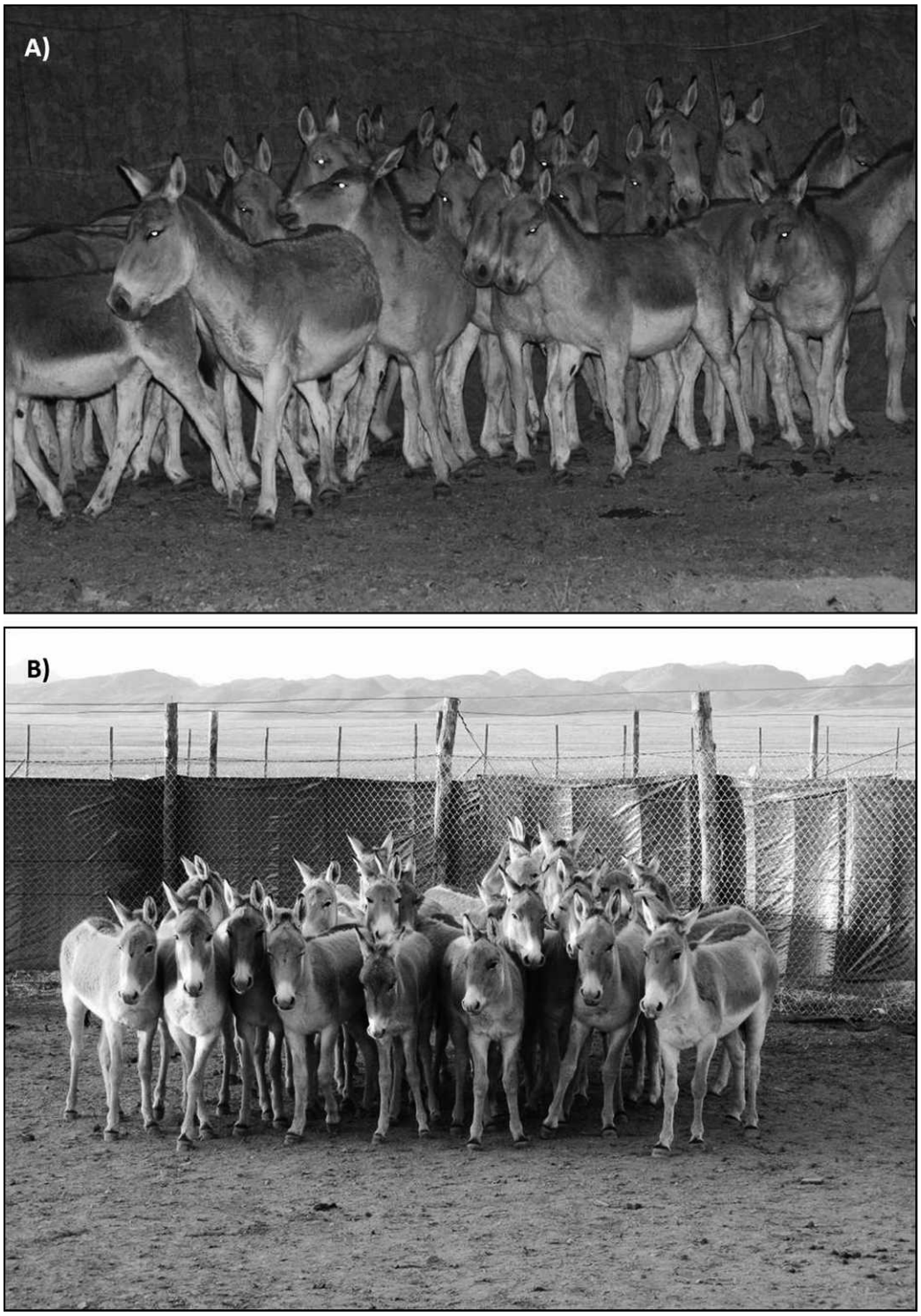
Appendices



Appendix I. Original design of the wild ass capture corral in Altyn Emel National Park in southeastern Kazakhstan. This design was used in the 2006 capture attempts.



Appendix II. Wild ass group in the capture corral in November 2010, immediately following the chase (A) and the next morning (B; photos: S.V. Sokolov).