

Short communication

PROTECTING HORSES AGAINST WOLVES IN GERMANY

Ernst-Hermann Solmsen¹, Markus Bathen¹, Theo Grüntjens¹, Enno Hempel¹, Moritz Klose¹, Konstanze Krüger², Hannelore Martin¹, Anke Meyer¹, Peter Schütte¹, Linda Vogel², Sarah Wiezorek², Bärbel Wittor¹

¹ Arbeitskreis Pferd und Wolf, Fachbeirat der Pferdeland Niedersachsen GmbH, Germany

Contact: solmsen@otterzentrum.de

² Hochschule für Wirtschaft und Umwelt (HFUW), Neckarsteige 6-10, D-72622 Nürtingen, Germany

1. Background

With the recovering population of grey wolves (*Canis lupus*) in Central Europe, livestock breeders face new challenges. The absence of large carnivores for more than a century led to loss of experience in guarding techniques. Whereas wolves predate on sheep and goats throughout Europe, their impact on horses is less widespread and intense, although known to be high in parts of Portugal, Greece and Italy (Linnell and Cretois, 2018).

In many countries, there is a presumption that horses are not a common prey of wolves (NABU, 2015), but in others such as Portugal, Romania and Mongolia there is evidence that they are preferred (Dorj and Namkai, 2013; van Duynne et al., 2009; Vos, 2000). A recent study in an area of northern Mongolia with a relatively high diversity of wild ungulates did not find any evidence of livestock in wolf diet, even where there were free-ranging horses (Tiralla et al., 2020). This supports the assertion that wolves prefer wild ungulates if they are sufficiently abundant (e.g. Imbert et al., 2016; Jedrzejewski et al., 2012; Meriggi et al., 2015). When wolves predate on horses in southern Europe, they usually target unprotected animals in open pastures (e.g. Fico et al., 1993; López-Bao et al., 2013).

Can these findings be extrapolated to Central Europe? Here, farmers' and equestrians' fears centre on two main concerns: that wolves may kill horses and, even more importantly, that they might cause them to panic, resulting in severe accidents (Grönemann, 2015). An analysis of the diet of wolves in Germany during the first eight years of the recolonisation process found that roe deer (*Capreolus capreolus*), red deer (*Cervus elaphus*) and wild boar (*Sus scrofa*) were the main prey whereas livestock (sheep) constituted just 0.6% of biomass consumed (Wagner et al., 2012). No wolf attacks on horses were confirmed in Germany in 2000–2014 (LJN, 2015), although documented kills of small stock increased throughout this period.

The first confirmed wolf attacks on horses in Germany were reported from the state of Saxony-Anhalt in spring 2015. In Oranienbaumer Heide, a former military training area now a nature reserve, semi-domestic horses known as *koniks* (Fig. 1) share the landscape with a rich variety of common wildlife such as roe deer, red deer, fallow deer (*Cervus dama*) and wild boar. Since 2008, these small horses as well as Heck cattle graze unsupervised year-round to keep heathland clear of trees and bushes. In 2014, a single female wolf established a territory in the area. In the



Fig. 1 Konik in Oranienbaumer Heide nature reserve.

(Photo: E.-H. Solmsen)

first year she showed no interest in the *koniks*, but in 2015 DNA samples taken from bite marks on newborn foals confirmed that the wolf had injured them. The following year, a young male wolf from Saxony joined her and the pair killed several foals. As it was not known how to protect *koniks* in open heathland, pregnant mares were temporarily relocated in order to avoid further predation (S. Caspers, pers. comm., 2016).

In Lower Saxony, a state with high affiliation to horse keeping and breeding, the first incidents of horses allegedly injured or killed by wolves were also in 2015. A total of 43 alleged incidents of wolf attacks on horses were officially registered in Lower Saxony in 2007–2019 (LJN, 2020). Wolf involvement was confirmed in at least four cases (Figs. 2 and 3). In 2020, 13 alleged wolf attacks on horses were reported in Lower Saxony. In six cases there was no evidence of involvement of a wolf. The other seven attacks, in which six horses were killed and four injured, were

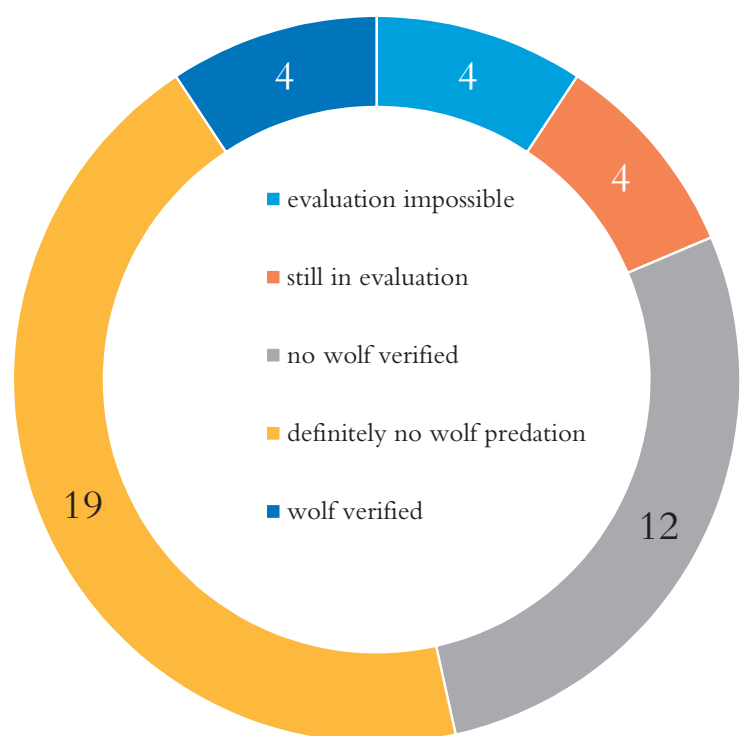


Fig. 2 Outcomes of official assessments of alleged wolf attacks on horses in Lower Saxony in 2007–2019. Source: LJN, 2020.

verifiably caused by wolves (Nina Kronshage, pers. comm., 2021). Genetic analysis showed that a resident wolf pair, reported to be experienced in attacking and killing cattle, was responsible in some cases (LJN, 2020).

2. Establishing a working group

Driven by these challenges, in 2013–2019 Pferde-land Niedersachsen GmbH formed a Horse & Wolf working group¹, comprising horse owners, biologists and members of NGOs in Lower Saxony. The main goal was to develop data-based recommendations to help farmers and equestrians adapt their husbandry to the presence of wolves in their surroundings. An additional goal was to provide a realistic estimation of the potential risks of horses fleeing from wolves, in terms of injuries to the horses themselves and possible traffic accidents.

The group collated information and data as a basis for developing useful tools and devices to prevent wolves from attacking horses. To tackle a perceived lack of knowledge, we sought to answer the following questions:

- How do horses behave when meeting wolves in the open?
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- Are there special cues that make horses attractive to wolves?
- What kind of anti-predator behaviours do horses present?
- Are there any cues that drive horses to flee in panic?
- When do horses defend themselves actively?
- Are these strategies influenced by herd characteristics?

Before starting original research to answer the above questions, the global need for more information was matched with current requests of the target group. The fears and concerns of Lower Saxonian horse owners and riders were evaluated using a standard questionnaire (Groenemann, 2015). A large amount of speculation was revealed, for example that horses would be frightened of wolf odour or wolf



Fig. 3 A horse predated by a wolf. (Photo: H. Wichmann)

howling and wolves would chase riders, verifying the need for research to obtain reliable information from real experience in the field.

A broad survey of the available literature gave an overview of current knowledge on the topic and supplied information to address several of the expressed concerns. A summary of the findings was published as a preliminary guide for riders and horse breeders (NABU, 2015).

3. Field studies

3.1 Breliendamm

To compile data on wolf-horse interactions in the field, we looked for an area where horses ranged throughout the night and wolves were known to be abundant in the surroundings. Matching data on known wolf territories to cooperative horse breeders,

¹ <https://www.pferdundwolf.de>

we chose Breliendamm, near Meissendorf (Figs. 4 and 5). Subsequently, in 2016 we designed and implemented a methodology to collect information about the behaviour of horses and wolves when they meet (Mersmann, 2017).

To observe encounters, we installed camera traps at the borders of two pastures, each with a different group of horses. Cameras pointed inside and outside grazing areas enclosed with three-strand electric fences. In addition, GPS collars recorded horse movements, allowing us to evaluate various aspects (moving singly or in groups, different velocities, etc.). Each week, GPS movement data were analysed and aligned with camera trap images. When a camera detected wildlife, we analysed the GPS data to look for synchronous changes in distances between collared horses as well as their movement speeds (Vogel, 2019). This provided insights into social behaviour within the herd at night, especially when wildlife was present nearby.

The following species were detected: roe deer, brown hare (*Lepus europaeus*) red fox (*Vulpes vulpes*),

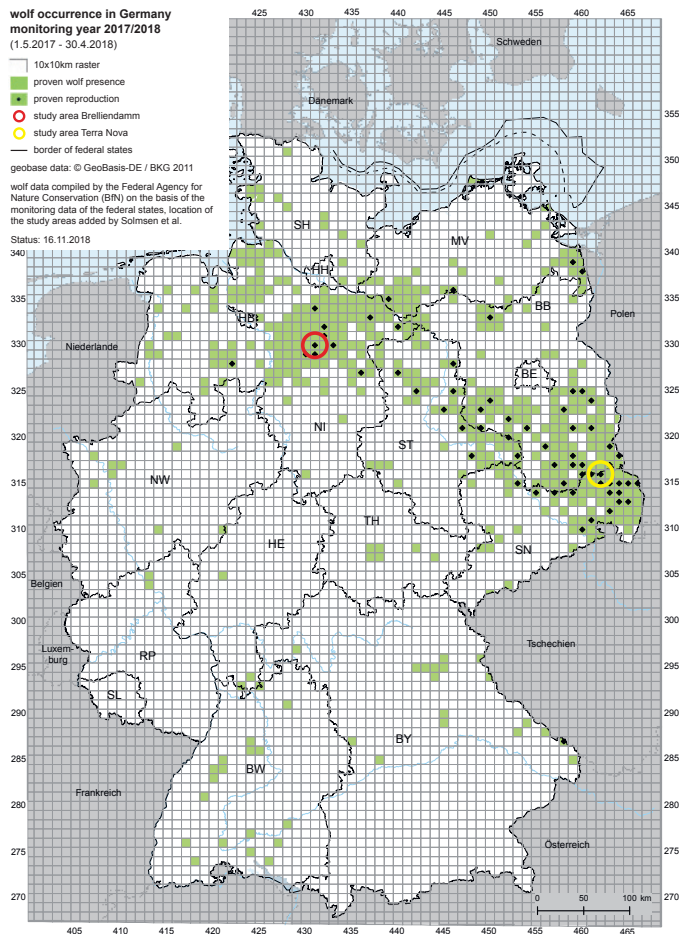


Fig. 4 Map of wolf occurrence in Germany, showing locations of study areas in Breliendamm and Terra Nova. Wolf data were compiled by the Federal Agency of Nature Conservation (BfN) on the basis of monitoring by federal states.



Fig. 5 Breliendamm study area with horse pastures shown in red.



Fig. 6 Wolves near Meissendorf. (Photo: camera trap by J.-R. Tilk, Bundesanstalt für Immobilienaufgaben)

badger (*Meles meles*), polecat (*Mustela putorius*) and martens (*Martes foina, M. martes*). Only 11% of documented wildlife contacts were associated with measurable changes in equine movement patterns. Unfortunately, no wolves were detected during the study, although several wolves were recorded by two of the cameras during the preparatory phase (Fig. 6). Thus, there is still a need for further scientific efforts on this issue.

3.2 Terra Nova

We ran a second camera trap study at the Terra Nova livestock farm near Elsterheide, Saxony (Fig. 4 and 7). Besides sheep and cattle, this farm also keeps horses in a former surface mining area restored to a savannah habitat. Resident wolves have been abun-



Fig. 7 Terra Nova study area, showing horse pastures in red.

dant in the area since 2004. After some initial problems, mostly concerning sheep, which therefore had to be protected with 120-high electric fences, all livestock was maintained in coexistence with the local wolf pack. Adult horses of various breeds (e.g. draught horses, Norwegian fjord horses, crossbreeds), ages (2–21 years) and both sexes formed heterogeneous, non-reproductive herds that stayed outside all year round. Herd composition changed several times during the study: some individuals were present throughout, others were replaced.

We installed nine cameras at four different sites from August 2017 until December 2018. This was done *ad hoc*, without following defined protocols, in order to identify wolf foraging routes in preparation for later research efforts. Consequently, the results are not suitable for statistical analysis and should be interpreted with care. Nevertheless, we obtained a total of 242 relevant pictures showing multiple wolves using pathways next to pastures and various aspects of the behaviour of horses. All pictures were evaluated by trained observers of wildlife (T. Grüntjens) and mammalian ethology (E.-H. Solmsen), paying particular attention to any agonistic behaviour and signs of emotional status. As this opportunistic ‘snapshot’ may contribute some small pieces to the uncompleted jigsaw, we share our initial findings here.

Our data reveal a bimodal distribution of wolf presence in the vicinity of horse pastures during the year. Cameras recorded very few pictures of wolves in April–August and December–January but considerably more in September–November and February–March (Fig. 8). As we expected, wolves used

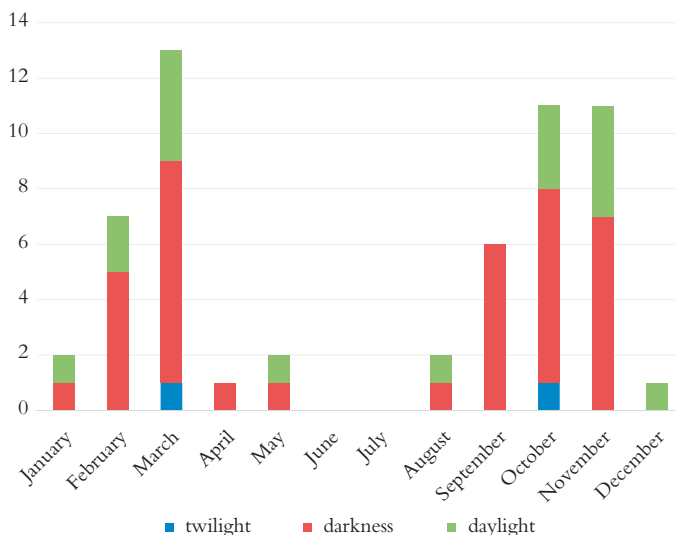


Fig. 8 Camera trap detections of wolves near horse pastures by month and time of day.

the area mostly at night and sometimes in twilight. However, they were also sometimes active in daylight, predominantly during the morning. The number of individuals observed per picture ranged from one to three, although comparing consecutive pictures revealed groups of up to five individuals foraging together. The largest groups were detected in March, August and November (Fig. 9).

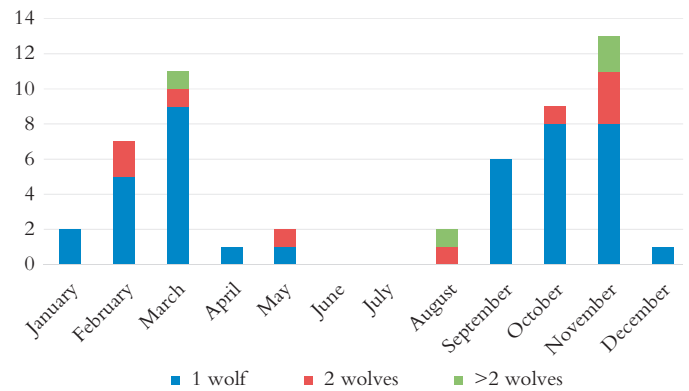


Fig. 9 Group size of wolves visible in camera trap pictures by month.

Wolves foraging alone mostly appeared relaxed and were apparently not concerned by cameras during daylight. At night, however, wolves often turned their heads towards cameras, alerted by the infra-red flash. Nevertheless, with very few exceptions (when they turned round and went back), they continued in their original direction (Fig. 10).

Wolves photographed approaching fences around horse pastures always did so very cautiously, showing body postures of alertness and defence: legs bent, ears pointing forward or flattened, tail curled between the



Fig. 10 Two camera trap images showing behaviour of foraging wolves at Terra Nova. (Photos: A. Meyer)



Fig. 11 Four camera trap images from two series showing a single wolf approaching the fence around a horse pasture.

(Photos: A. Meyer)

hind legs (Fig. 11). We do not know the reason for their concern; maybe they were suspicious of fences, but it could be evidence that they are afraid of some horses, which are known to react aggressively toward dogs and foxes that enter pastures. One of us (A. Meyer) even saw horses kill a fox.

Single wolves using pathways next to pastures for foraging in daylight did not show any apparent interest in the horses, whereas the horses showed a certain level of alertness, turning their heads towards passing wolves (Fig. 12).

4. Conclusions and recommendations

Our first efforts to generate and evaluate robust data on horse-wolf encounters have been limited by the general rarity of their occurrence. At both our study sites, wolves were very rare visitors to pastures. The risk of horses being predated by resident wolves appears to be low. Whenever they were detected, wolves just passed by and showed no visible attempts

to attack horses. Nevertheless, as several confirmed cases of damage in Lower Saxony show, wolves are capable of killing horses in some circumstances. Further investigations are needed to identify possible predis-

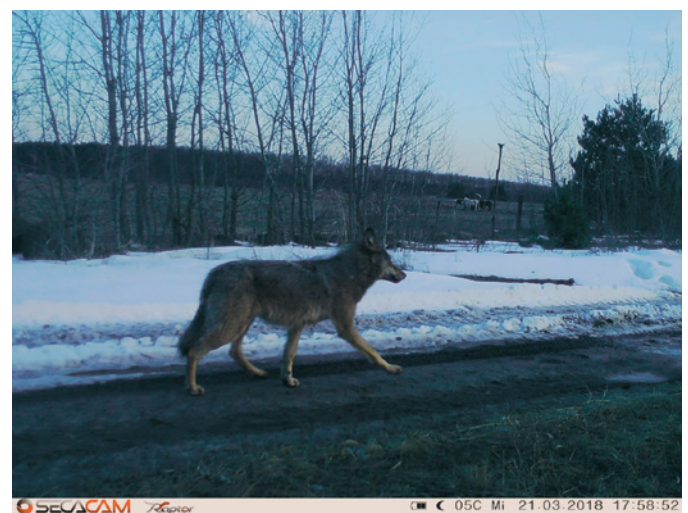


Fig. 12 Camera trap image of a single wolf moving along a pathway between pastures. Three horses are visible in the background, one of which (a white mare) has turned its head towards the wolf.

(Photo: A. Meyer)

posing factors. As wolves mainly forage at night, suitable techniques such as night vision equipment will be required to reveal what goes on “outside after dark”.

Considering these observations and our findings so far, we make the following recommendations to avoid making horses attractive prey for wolves:

1. Fences should be in good working order (Fig. 13). Poor fencing (Fig. 14) allows foals to leave their mothers or horses to break out in panic when afraid. If wolves are in the area, especially if known to attack large livestock, we recommend using electric wolf-deterrent fences² to protect horses kept outdoors, especially smaller breeds.
2. Foraging wolves may avoid some horses, such as a Norwegian stallion at Terra Nova, that show aggressive or active defensive behaviour towards canids. On the other hand, if there is concern about wolves frightening horses, herds with calm individuals may be less easily scared (Keeling et al., 2016).
3. Unguarded mares giving birth to foals in the open should be avoided. If the placenta is not removed by the horse breeder or by the mare herself, various

scavengers may be attracted such as foxes, ravens and badgers but also wolves. Once they gain experience of scavenging on horse afterbirth, wolves may try to attack foals as prey.

4. Whenever possible, we suggest keeping horses in heterogeneous natural groups of various ages and temperaments as well as both sexes which may be helpful in strengthening their inherent defensive behaviours.



Fig. 14 Fence in poor condition.

(Photo: T. Gruentjens)



Fig. 13 Recommended wolf deterrent fence.

(Photo: P. Schuette)

² For further information see the article by Schuette in this issue of *CDPnews*.

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