Parent Origin and Wolves' Conflict

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Definition

We researched whether the behavior of young migrating wolves (loners), after they leave the pack, resembles parent pack (PP) behavior. Fourteen loners entering the Netherlands could be identified and genetically linked to their PPs. Like their PPs, some young wolves killed sheep and were near humans, others killed sheep and did not approach humans, while two loners were unproblematic, they did not kill sheep nor were they in proximity to humans. Thus, the PP behavior did predict loner's behavior and human-wildlife conflicts may be similar between young wolves and their PPs. However, conflicts need not arise. To achieve that, new prevention methods are proposed to teach wolves in the PP not to approach sheep and humans. As a result, new generations may not be problematic when leaving the PP.

1. Introduction

Wolves in Europe live in territorial packs of about 2–7 animals. A pack resembles a family and usually consists of a breeding pair, their offspring from previous years, and sometimes unrelated wolves. All members of the family pack cooperate in raising the cubs, i.e., they protect them, feed them [1], and train them in social, hunting, and survival skills [2]. Compared to other social canids, wolves are parented for a relatively long time [3]. The cubs suckle milk and feed on partially digested food regurgitated by the parents or elder siblings until weaning at 10 weeks of age. During these weeks, they receive more and more carcass pieces and complete, but small, opened carcasses [4]. In this way, they become accustomed to the smell and taste of the prey that constitutes their diet [5]. Young wolves tend to imitate pack members [6] and around the time of weaning, they begin to follow pack members to carcasses [7][4]. Young wolves observe how prey is killed, and as they become stronger, they actively participate and train to approach and kill prey [5][8]. Thus, young wolves develop a keen knowledge of what prey is, as well as habits and search patterns that increase their hunting efficiency [1][9][10] and their chance of survival [11]. It is generally accepted that the transmission of experience about prey and habitat is instrumental in preparing a new generation. It is expected that the behaviour of loners that have entered the Netherlands resembles the behaviour of their German parent pack.

2. Conclusions

Our results are in an agreement with the hypothesis that there is a high degree of similarity in prey and habitat choice between parent packs and their loners. They are similar regarding sheep killing or not and being in proximity to humans or not.

Of the 17 identified loners, three loners (nr 2, 3, and 13) were not associated with kills of farm animals (Table 2). Two of them were seen (wolves nr 2 and 3). Thus, the probability of actually observing a loner that could not be detected by farm animal kills was at least 2 out of 17, so 12%. These two wolves could be the tip of an iceberg and representatives of a larger subpopulation of unobserved wolves: wolves that did enter the Netherlands, but did not kill farm animals and went unobserved. If so, it is remarkable that a subpopulation of loners enters and crosses the Netherlands without killing farm animals; sheep in particular, as sheep are considered easy prey [12][13][14][15]. In this respect, there are three significant observations. First, the three wolves mentioned above were present in the same or similar areas where other wolves have killed sheep. Second, the sheep density in the Netherlands is three times higher than in German states where the parent packs live [16]. Therefore, the Dutch conditions make it even more unlikely that a loner does not encounter and kill a sheep. Thirdly, access to sheep has hardly any threshold, as by the absence of wolves over 170 years, Dutch sheep are kept without special protection from wolves. Thus, the availability of sheep cannot explain why there are loners that do not kill sheep.

Other explanations for selecting sheep as prey are also mentioned, such as development of specialization [17][18][19], or the development of an ecotype with a feeding preference or a feeding habit [19][20]. Thus, learning mechanisms are involved. References to learning mechanisms are “development of hunting experience” and “learning from parents” [8][10][14] or “learning differences between packs” [21]. Indeed, similarity between choices of wolves in the parent pack and their migrating offspring gives a corresponding explanation. This possibly applies to the three wolves mentioned above, if they stuck to prey familiarized to them through experiences gained in the parent pack. The loners were young wolves at detection in the Netherlands with a median age of 20 months, as commonly found for young dispersing wolves [22][23]. If in the period before dispersal, parent packs fed their young wild prey only and showed their maturing young how to find, approach, and kill wild prey (like roe deer), then the loner has left the pack only familiarized with these species. In cases where sheep have not been part of the diet or hunt, they have not learnt about sheep as prey. We suggest that a wolf will have no drive to explore new prey, such as sheep, as long as familiar wild prey density sustains survival and reproduction. The common notion that sheep are easy prey may only be true for wolves that are familiar with sheep. Conversely, the prediction that wolves will not kill sheep if there is sufficient wildlife [14][15][24] may be incorrect for wolves that are familiar with sheep.

In cases where the abundance of familiar wildlife prey is falling, it cannot be ruled out that a naïve wolf starts exploring farm animals like sheep on its own. Roe deer are wild ungulates strongly preferred by German wolves, making up 52–54% of the consumed biomass [13][25]. Therefore, it could be expected that German wolves, familiar with and normally focused on roe deer, tend to start to kill sheep in areas where sheep densities are high and roe deer density falls. As discussed above, the Netherlands has a sheep density three times higher than the German states where the parent packs are living. However, the Dutch roe deer density of 3.7/km^2 is likely to be lower than densities in the German states where the parent packs are living. For instance, in Sachsen the estimated density was 4.8 in 2015, as calculated from the annual roe deer cull [26], wolf kills [13] and agriculture and nature area size [27]. The relatively high sheep density and likely low roe deer density in the Netherlands make it all the more remarkable that loners 2, 3, and 13 did not start to kill sheep when entering this country. It strengthens the conclusion that prey preference of loners cannot be fully explained by prey availability and that early life experiences in the parent pack are involved.

Vertical transmission of experience implies that human–wolf conflicts may increase not only due to expanding wolf populations. They may also increase by reproduction of parent packs with a habit of killing sheep or being near humans, and a subsequent dispersal of a new generation with similar habits. When weighing the problem of proximity to humans with the problem of killing farm animals, the latter is more severe, as a wolf attack has a severe impact on the welfare of involved sheep, results in production losses [28] and it may lead to (illegal) killing of wolves [14][15][16][29][30]. Moreover, it is a particular problem with loners as their migration pattern is difficult to predict. As a consequence, prevention measures may be taken ad hoc, too late, and only after kills of farm animals have taken place. This difficulty implies the need to reduce their likelihood in another way, which can be through developing methods preventing farm animal killing experiences, while the individual wolf is still in the parent pack. Thus, in particular, herds near the pack should be properly protected. However, current methods such as electric fences and guarding dogs are not always effective or possible [31]. Therefore, additional methods need to be developed focussed on teaching wolves in their pack to stay away from sheep. We suggested three methods for each phase in the hunt: one immediately deterring wolves approaching a herd, a second delivering a shock to the wolf when biting a sheep and a third causing nausea when a wolf consumes sheep. The methods combined contribute to teaching wolves and their offspring not to approach, bite, and consume sheep, in particular when alternative food resources are abundant, such as wild ungulates.

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Keywords

human–animal conflict;wolf behavior;migrating wolves;sheep killing;early-life experiences;bold wolves;learning;depredation;deterrence