Influence of Time Spent in Captivity on Aggressive Behaviors of Gray Wolves *Canis lupus*

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Knowledge of the characteristics that promote group success is key to understanding the adaptive advantages of sociality for many group-oriented species. In this study, nine Gray Wolves *Canis lupis* were each observed twelve times over a period of six months to determine if the amount of time spent in the wild/captivity had any effect on aggressive behaviors. The number of aggressive behaviors were recorded for each wolf during each observation. The nine wolves were separated into three groups depending on their upbringing; born and raised in captivity, born in the wild and raised in captivity, and born and raised in the wild. A one-way analysis of variance (ANOVA) and three independent sample t-tests (with Bonferroni correction) were conducted to test for significant differences. There was a significant difference in the amount of aggressive behaviors among upbringings ($p = 0.02$), providing evidence to suggest the amount of time spent in the wild/captivity does influence the amount of aggressive behaviors demonstrated by a wolf.

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Introduction

Wolf *Canis lupus* packs have long been used as examples to describe behavioral relationships among members of social groups. The typical wolf pack is a family, with the adult parents guiding the activities of the group in a division-of-labor system in which the female tends to care for and defend the pups and the male primarily focuses on finding food and foraging (Mech 1999). As wolf packs are almost always family units, most commonly comprised of a breeding pair and their offspring from several years, amiable behavior within the pack is unsurprising (Cassidy 2016). The subject of social dominance and alpha status has become a well-known topic. The fundamental view of a wolf pack is that of a group of individuals all fighting for dominance but who are held in check by the alpha male and female of the pack.

Wolves are highly social animals. Communication between pack members is crucial for wolves to care for and feed their young, defend their territory, and work together to take down prey larger than they could as an individual. A great deal of the communication among wolf pack members involves body language (Mech 1999). Wolves have developed specialized behaviors and postures that help reduce aggression between the members of each pack. Body language helps the pack live together more agreeably. Facial expressions are another form of body language wolves use to express emotions. Wolves can indicate dominant or aggressive behavior by baring their teeth, specifically incisors, snarling, nipping, biting, and pointing erect ears forward. Subordinate behavior can be indicated by closed mouths, narrow eyes, and ears pulled back and held close to the head (Kerkhove 2004). Another major body language that wolves use to communicate emotion is tail position. Wolves who are threatening another wolf hold their bodies and tails high and erect, while submissive wolves lower their bodies to the ground before dominant pack members, and tuck their tails between their legs. Although many animals live in groups, only some are considered territorial, meaning they are willing to fight other groups or invading individuals to protect their territory (Cassidy 2016).

Most research on the social dynamics of wolf packs has been conducted on wolves in captivity. Little research has been done on the social behaviors of wolves in the wild. The focus of this study is to determine whether the amount of time

the wolf has spent in the wild/captivity will affect the aggressive behaviors of that individual. Understanding the social dynamics of top-predators is essential to assessing their impact on the ecosystem and to guide management for these animals.

Methods

The aggressive behaviors of nine Gray Wolves at the International Wolf Center of Ely, MN and the Wolf Conservation Center in South Salem, New York were observed, via webcam, for a period of six months. Each wolf was observed for a duration of 5 minutes, every two weeks. These nine wolves were separated into three different groups based on their upbringing; born in captivity and raised in captivity (BCRC), born in the wild and raised in captivity (BWRC), born in the wild and raised in the wild (BWRW). There were three wolves monitored in each of these groups. The three wolves in the group BWRC were born in the wild and brought into captivity at around two years of age.

The aggressive behaviors were distinguished by six main bodily expressions; fur bristles, erect ears, incisors displayed, snarling, nipping, and biting. When the aggressive behavior was displayed, the behavior was recorded next to the respective wolf's name. The number of aggressive behaviors were totaled for each wolf over the 12 times they were observed. These aggressive behaviors were typically displayed when the wolves were eating, or when a member of the pack was invading the personal space of another pack member who was agitated. Often, several of these behaviors would occur at one time.

A one-way analysis of variance (ANOVA) was conducted to see if there was a difference in the number of aggressive behaviors among the three distinct upbringings (Zar 1999). A post-hoc comparison procedure (t-tests with a Bonferroni correction; $\alpha = 0.017$ instead of $\alpha = 0.05$) was then conducted if the ANOVA was significant.

Results

A significant difference in the quantity of aggressive behaviors was found among the different upbringings ($F_{(2,6)} = 7.36$, $p = 0.02$; Figure 1). Post hoc pairwise comparisons indicated the number of aggressive behaviors were not significantly different between BCRC and BWRC ($t_{(4)} = -2.78$, $p = 0.05$), or BWRC and BWRW ($t_{(4)} = -1.00$, $p = 0.37$). However, there was a significant difference between BCRC and BWRW ($t_{(4)} = -4.23$, $p = 0.01$).

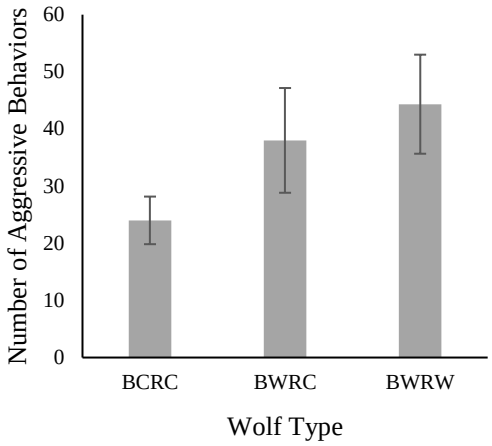

Figure 1. Number of aggressive behaviors plotted against the three wolf types; born in captivity and raised in captivity (BCRC), born in the wild and raised in captivity (BWRC), born in the wild and raised in the wild (BWRW). Black bars indicate ± 2 standard errors.

Discussion

In this study, there was evidence to suggest that the upbringing of a wolf can influence how many aggressive behaviors they will display. Based on these results, wolves who are born and raised in the wild will ultimately display more aggressive behaviors than wolves born and raised in captivity. The overall increase in aggressive behaviors can be contributed to several factors, including but not limited to human interaction, feeding habits, and pack dynamics. Wolf habituation and food conditioning can also impact the behavior of wolves (Smith 2003). Wolves can lose fear of humans by having frequent and increasingly closer contact with them, thus making them less aggressive. Nonetheless, wolves are instinctive wild predators better kept at a respectful distance.

The results of this study may help to guide the future management of wolves and predict the aggression levels of wolves based on their upbringing. Observation and research into wolf social organization and pack dynamics, especially the levels of aggression, are important in providing information to ensure the health and safety of the wolves, as well as the caretakers (White 2001). Further research can be done to determine whether captivity has positive/negative

effects on the wolves, and whether the individuals can be released into the wild after spending a fair amount of time in captivity.

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