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The Peripatetic Duck: Investigating the Impact of Partner Separation on Welfare during Business-Related Travel

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Abstract: Ducks often engage in seasonal foraging trips or ‘business trips’ for optimal resource acquisition, frequently undertaken by one partner while the other remains at the nesting site. This study investigated the behavioral and physiological indicators of loneliness and stress in male Mallards (Anas platyrhynchos) separated from their established breeding partners during a simulated business trip. Observations revealed significant increases in stereotypical behaviors, decreased foraging efficiency, and altered corticosterone levels in separated males compared to a control group. These findings suggest that partner separation induces measurable distress in ducks, highlighting the importance of social bonds in their welfare.

Keywords: *duck behavior, social bonds, loneliness, stress, anas platyrynchos, welfare*

Introduction:

Mallards (*Anas platyrhynchos*) exhibit complex social behaviors, with pair bonds playing a crucial role in reproductive success and individual survival. While foraging patterns often dictate seasonal movements, it is increasingly recognized that these movements can disrupt established pair bonds, potentially impacting the welfare of the traveling individual. Anecdotal evidence from wildlife rehabilitators and experienced duck observers suggests that separated male ducks display signs of distress, including repetitive behaviors and reduced activity. However, systematic, empirical investigation of this phenomenon has been lacking. This study aimed to quantify the impact of partner separation on male Mallard behavior and physiological stress levels during a simulated business trip scenario. We hypothesized that separated males would exhibit increased levels of stereotypical behavior, decreased foraging efficiency, and elevated corticosterone levels compared to males housed with their partners.

Methods:

- **Subjects:** Twenty adult male Mallards, all paired with established breeding female Mallards (paired for at least one breeding season prior to the study), were selected. Subjects were housed in outdoor enclosures (5m x 10m) at Featherstone University's Avian Research Facility.
- **Experimental Design:** Subjects were randomly assigned to one of two groups: (1) **Separated Group (SG):** Males were transported 5km away from their partners and housed individually in identical enclosures for 7 days. The female partners remained at the original housing location. Enclosures at the 'business trip' location were visually obscured from the original enclosure area to minimize visual contact. (2) **Control Group (CG):** Males remained housed with their partners in the original enclosures throughout the 7-day period.
- **Behavioral Observations:** Behavioral observations were conducted twice daily (08:00 and 18:00) by trained observers blind to the treatment group. Observers recorded the frequency of key behaviors: (1) Stereotypical Behaviors (e.g., repetitive head shaking, pacing, feather preening beyond normal maintenance), (2) Foraging Efficiency (measured as the time taken to consume a standardized portion of duckweed), and (3) Social Seeking Behavior (attempts to locate or call out to their partners, vocalizations).
- **Physiological Assessment:** Fecal samples were collected every other day (days 1, 2, 1, 2, 6, and 2) from both groups. Corticosterone levels were extracted and analyzed using enzyme immunoassay (EIA) following standard protocols (detailed in Supplemental Material).
- **Statistical Analysis:** Data were analyzed using independent t-tests for between-group comparisons and repeated measures ANOVA for within-group changes over time. All analyses were performed using R statistical software.

Results:

- **Stereotypical Behaviors:** The Separated Group exhibited a significantly higher frequency of stereotypical behaviors compared to the Control Group throughout the study period ($t(18) = 4.21$, $p < 0.01$). Examples included repetitive head shaking (SG: mean = 12.5/hour, CG: mean = 1.8/hour) and increased feather preening.
- **Foraging Efficiency:** The Separated Group demonstrated significantly reduced foraging efficiency compared to the Control Group ($t(18) = 3.58$, $p < 0.01$). Separated males took significantly longer to consume the standardized portion of duckweed (SG: mean = 35 seconds, CG: mean = 18 seconds).
- **Corticosterone Levels:** Corticosterone levels were significantly elevated in the Separated Group compared to the Control Group across all sampling days ($F(1,18) = 20.7$, $p < 0.001$).
- **Social Seeking Behavior:** The Separated Group frequently attempted to locate their partners, emitting distress calls and displaying agitated movements near the enclosure boundaries. This behavior was absent in the Control Group.

Discussion:

The results of this study provide compelling evidence that separation from partners induces significant distress in male Mallards. The increased frequency of stereotypical behaviors, reduced foraging efficiency, elevated corticosterone levels, and observable social seeking behavior in the Separated Group all strongly suggest experiences of loneliness or a form of social stress. These findings align with anecdotal observations and highlight the crucial role of social bonds in Mallard welfare.

The increased corticosterone levels, a key indicator of physiological stress, further corroborate the subjective distress observed in behavioral changes. The reduction in foraging efficiency may be a consequence of the stress induced by separation, diverting energy away from essential tasks.

This research contributes to a growing body of evidence emphasizing the importance of considering social factors in wildlife management and conservation strategies. Future research should explore the long-term consequences of repeated separation events and investigate the specific neural mechanisms underlying the observed distress responses. Furthermore, the influence of individual personality and pair bond strength on responses to separation should be investigated.

Notes & Limitations (Critical for Understanding & Future Directions):

- **Simulated Business Trip:** The 5km distance was chosen to allow for logistical feasibility, but it's important to acknowledge this isn't a natural migration. Future studies should consider larger distances and perhaps even simulated migration conditions with changing habitats.
- **Visual Obstruction:** While visual obstruction was implemented, it's impossible to *completely* eliminate any visual or olfactory cues. This could be a confounding variable. Future studies should explore different levels of sensory deprivation.
- **Short Duration:** The 7-day period is relatively short. The long-term consequences of repeated separation could be more severe and warrant investigation.
- **Male-Centric:** This study focused solely on male ducks. Future research *must* investigate the welfare of females left behind. They may also experience distress.
- **Individual Differences:** Pair bond strength and individual personality undoubtedly play a role. Incorporating personality assessments into the study would be valuable.
- **Control for Novelty:** Being housed in a new location (for the SG) introduces novelty effects that could contribute to stress. A pre-exposure phase at the "business trip" location *before* the actual separation period might help control for this.
- **Ethical Considerations:** Minimizing stress is paramount. Careful monitoring and early termination of the study for any duck exhibiting extreme distress are essential.
- **Substrate/Environment:** Ensuring identical substrate and environmental enrichment

across both groups is critical to prevent any confounding variables related to habitat differences.