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ARE OWLS REGULAR?: AN ANALYSIS OF PELLET REGURGITATION TIMES OF SNOWY OWLS IN THE WILD

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Abstract

This study analyzes the temporal distribution of pellet regurgitation by wintering Snowy Owls (*Nyctea scandiaca*). Pellets were cast more frequently from 1400 to 1800 (MST) than during other daylight hours. The apparent regularity of this pattern of regurgitation and its relationship to the feeding time of the owls are considered.

Introduction

Research on the digestive process of owls has focused on the regulation of the meal to pellet interval (MPI). This interval appears to be important because owls do not possess crops and must empty their stomachs periodically in preparation for new food (Ziswiler and Farner 1972). Duke and Rhoades (1977) have shown in the laboratory that the quantity of food ingested, the time of day that feeding occurs, and the nutrient composition of prey affect the MPI of Great Horned Owls (*Bubo virginianus*). Fuller and Duke (1979) have demonstrated that multiple feedings, spaced over a period of time (2–3 hrs), increase the MPI of captive Great Horned Owls.

Very few field observations of the interval between feeding and pellet regurgitation have been published. This note describes the temporal pattern of pellet casting by Snowy Owls (*Nyctea scandiaca*) in the wild, and uses results from laboratory studies of the digestive physiology of strigiforms to suggest the significance of this pattern.

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Methods

Observations of Snowy Owls were made during the winters of 1976-77 and 1977-78 near Calgary, Alberta. Approximately 200 hours of detailed observations of resident individuals, and over 400 hours of more casual observations, were made during daylight hours (0630-1800 M.S.T.). We recorded 15 instances of pellet casting. In each case we noted the time and the behavior of the owl, and collected the pellet for analysis of food habits. Because of the small number of observations, samples from both years are combined. The owls utilized a similar prey base, and maintained similar activity budgets in both years (Boxall 1980). *Peromyscus maniculatus* and *Microtus pennsylvanicus* were the prey recorded most frequently in pellets.

Results and Discussion

The temporal distribution of 15 pellet regurgitations is shown in Figure 1. An expected distribution was calculated on the basis of a random distribution of occurrences, corrected for the observation time during each period (Fig. 1). The observed and expected distributions differ significantly (Kolmogorov-Smirnov one-sample test; $p<0.05$). Regurgitations were more frequent between 1400 and 1800 than at other times of the day (Chi-square test; $p<0.01$). Almost 50% of the regurgitations were observed between 1400 and 1600.

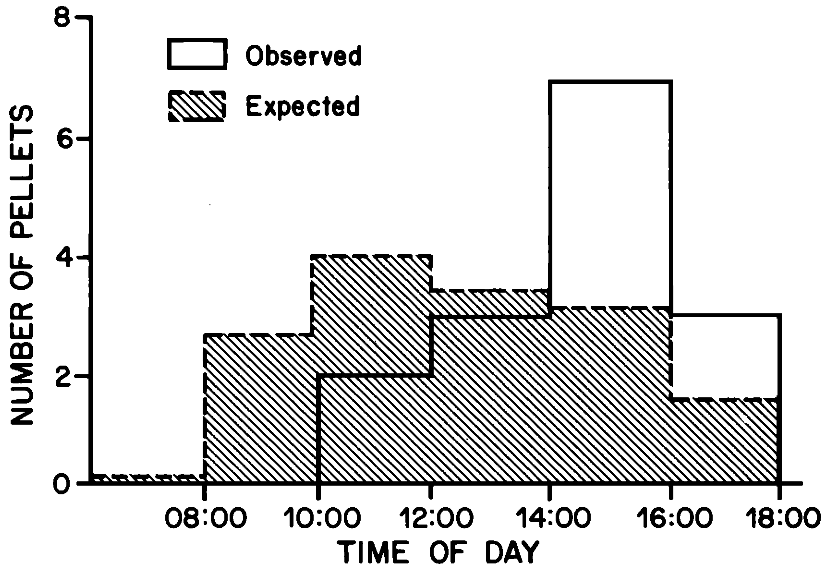

Figure 1.—The distribution of pellet regurgitations by time of day. Also shown is an expected distribution of regurgitations based on a random distribution by time period, corrected for observation time.

Snowy Owls on the wintering grounds are more active during the late afternoon than during other daylight hours (Keith 1960; Nagell and Fryklund 1965), and the owls that we observed in southern Alberta apparently do much of their hunting at this time (Fig. 2). Since the presence of a pellet in the stomach of an owl may prevent it from eating (Chitty 1938; Duke et al. 1976), one would expect that pellet regurgitation would occur prior to hunting. The owls that we observed appeared to do this. Pellets were cast between 1400 and 1800, shortly before the owls started hunting. In fact, in 5 of our observations the owls cast pellets from 5 to 30 minutes before they were observed to capture

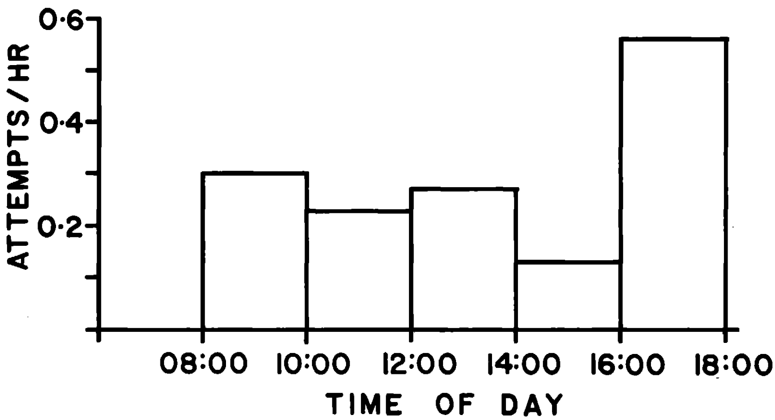

Figure 2.—Attempts by Snowy Owls to capture prey at different times of day, expressed as rates of capture attempts per hour of observation. Based on a sample of 36 attempts.

prey. On only one occasion was an owl seen to cast a pellet after capturing prey. This bird captured a mouse and spent about 5 minutes trying unsuccessfully to swallow it. The owl finally remained still for several minutes, cast a large pellet, and then swallowed its prey. Chamberlin (1980) describes a similar observation.

Duke et al. (1976) determined that the MPI of captive Snowy Owls fed at 0900 ranged from 7.9 to 16.2 hours. Chamberlin (1980), noting that Snowy Owls foraged primarily in the early morning (0730 EST) in Wisconsin, observed MPI's of 5.6 and 7.2 hours in the field. However, Chitty (1938) and Duke and Rhoades (1977) demonstrated that the MPI is significantly longer if the prey represented in the pellet are ingested in the late afternoon rather than early in the day. Furthermore, the amount of food ingested and its period of intake have been shown to influence the MPI of owls (Chitty 1938; Duke and Rhoades 1977; Fuller and Duke 1979). In our study, Snowy Owls captured small mammals more frequently than larger prey (Boxall and Lein 1982), and obtained these prey late in the day more frequently than early in the day (Fig. 2). Therefore, daily food requirements were probably met by ingesting several prey items over a period of time in the late afternoon and early evening. When captive Great Horned Owls were fed *Mus musculus* in this manner, the MPI ranged from about 19 to 22 hours (Fuller and Duke 1979). Most of the pellets that we observed being cast during the late afternoon probably represented prey captured over a 3–4 hour interval at about the same time the previous day. Chamberlin's (1980) much shorter MPI's are not directly comparable to our findings, due to the early feeding times of his birds. In addition, he does not provide data on the number of types of prey species recovered from the two pellets he observed being cast. Pellets containing one small prey item have been shown to be cast in less time than pellets representing several small items or one large prey item (Duke and Rhoades 1977).

Observations of prey capture and subsequent pellet regurgitation by birds of prey are very difficult to obtain, as evidenced by the small samples we obtained in comparison to the observation time. However, even the limited data we present are useful in extrapolating from laboratory results to the field situation.

Acknowledgments

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ANNOUNCEMENT

Raptor Diseases.

The Proceedings of the 1st International Symposium on Diseases of Birds of Prey, held in London on July 1–3, 1980, are now available. These Proceedings, entitled "Recent Advances in the Study of Raptor Diseases," contain the majority of the papers presented at the Symposium and cover subjects as diverse as behaviuor, toxicology, microbiology, anaesthesia, and surgery. Particularly relevant to those involved in the management of captive raptors are the sections on hand-rearing and laparoscopy, while the section on mortality factors in wild populations will be of value to ecologists. The publication updates the literature on raptor disease and discusses the latest developments in the field. It will have appeal to veterinarians, wildlife biologists, ornithologists, falconers, and aviculturists. Copies may be obtained from Chiron Publications Ltd., P.O. Box 25, Keighley, West Yorkshire, BD22 7BA, U.K. at 11 pounds (U.K. & Europe) and 12 pounds (elsewhere).