

Coprophagy by Ornate Box Turtles, *Terrapene ornata* (Agassiz, 1857), in Roosevelt County, New Mexico, USA

Thanchira Suriyamongkol^{1,*}, Alissa A. Kreikemeier¹, and Ivana Mali¹

Terrapene ornata (Agassiz, 1857) is a grassland turtle species that commonly inhabits semiarid environments of central North America (Degenhardt et al., 1996; Dodd, 2002). In the U.S. state of New Mexico, *T. ornata* is widespread, with the exception of the northwestern region (Degenhardt et al., 1996). Dietary knowledge of *T. ornata* is limited but these turtles are generally considered opportunistic omnivores with a preference for animal prey including invertebrates (Degenhardt et al., 1996; Platt et al., 2012). Box turtles have previously been observed eating invertebrates found in cow dung as well as the dung itself (Blair, 1976; Degenhardt et al., 1996; Parandhaman and Forstner, 2018).

From August–October 2018, we conducted transect line surveys for *T. ornata* in Roosevelt County, New Mexico, USA. We surveyed 34 sites with a combined size of approximately 87 km², where we visually searched for ornate box turtles. At each site, we walked three to nine 1.6-km transect lines on the same day, with each site visited only once. Search time per transect line varied from 30–60 min based on terrain and vegetation density. We encountered *T. ornata* at 12 sites, of which six were inhabited by cattle at the time of the surveys. Within the six sites inhabited by cattle, 19 *T. ornata* were encountered, and three of those turtles were found on the mounds of cow faeces (hereafter, cow dung).

On 27 August 2018 at ca. 08:20 h, two juvenile *T. ornata* were encountered within close proximity of each other (~98 m apart), positioned directly on cow dung (Table 1; Fig. 1A). The cow dung was noticeably fresh, with areas of the dung visibly moist and moist to the touch. There was an absence of noticeable invertebrates within and surrounding the dung. Although feeding was not directly observed, upon physical examination, dung

components were seen on the beak and in the mouth areas of both juveniles. On 23 September 2018 at ca. 10:12 h, an adult *T. ornata* was encountered consuming cow dung (Table 1; Fig. 1B). The head of this *T. ornata* was observed to be submerged in the dung, and there was a noticeable number of invertebrates present.

Coprophagy has been observed in terrestrial and aquatic turtles (e.g., Mares, 1971; Goodman and Stewart, 1998; Platt et al., 2009; Parandhaman and Forstner, 2018). This behaviour, however, has been reported infrequently in the literature (Platt et al., 2009). To the best of our knowledge, ours are the first observation of coprophagy by juvenile ornate box turtles. The motivation for consumption of faecal material, including dung, is unknown. Blair (1976) and Degenhardt et al. (1996) considered it an inadvertent consequence of harvesting dung beetles because these were the most commonly seen insect prey found in association with dung (Platt et al., 2012). Furthermore, the observed instances of coprophagy may be attributed not only to arthropod consumption but also for acquiring moisture and nutrients (Parandhaman and Forstner, 2018).

In general terms, coprophagy can also be considered as a commensal relationship between turtles and large herbivores. For example, the Arakan Forest Turtle, *Heosemys depressa* (Anderson, 1875), was considered the “turtle that eats rhinoceros faeces” (Platt et al., 2010: 116), a description clearly suggesting coprophagy, as the range of these turtles historically overlapped with the range of the Sumatran rhinoceros, *Dicerorhinus sumatrensis* (Fischer, 1814) (reviewed in Platt et al., 2010). In low primary productivity areas such as grassland and desert ecoregions (Jackson and Jackson, 2000), coprophagy could represent an adaptation in box turtles to acquire additional water and nutrients, given their range overlaps with the historical range of North American Bison, *Bison bison* (Linnaeus, 1758) (Sanderson et al., 2008). Roosevelt County is known for intense agricultural practices, especially cattle ranching (Rawling, 2016). As the climate becomes drier and rain events scarcer, we anticipate even greater reliance of box turtles on cattle coprophagy for acquisition of moisture.

¹ Department of Biology, Eastern New Mexico University, 1500 South Avenue K, Portales, New Mexico 88130, USA.

*Corresponding author. E-mail: thanchira.suriyamongkol@enmu.edu

Table 1. Body measurements of *Terrapene ornata* found on the mounds of cow dung in September 2018 in Roosevelt County, New Mexico, USA. Abbreviations include carapace length (CL), carapace width (CW), plastron length (PL), and plastron width (PW).

Age Class	Mass (g)	CL (mm)	CW (mm)	PL (mm)	PW (mm)
Juvenile	81	72	65	69	49
Juvenile	100	73	64	73	56
Adult	205	96	85	91	67



Figure 1. Juvenile (A) and adult (B) *Terrapene ornata* discovered on cow dung mound in Roosevelt County, New Mexico, USA. Photo by Alissa A. Kreikemeier.

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