

**Project Perch's mission is to protect and nurture the Burrowing Owl in SE Florida.
A real life HOOT, join now!**



Project Perch's BuOw Blog 3

Tuesday, May 25, 2013

Nest Decoration, Dung Décor, Burrow Microclimate, the "Bait and Wait" and the Carcass

Nest Decoration

On May 20, 2013 there was a small dark pile of something to the right of the burrow entrance. We wanted to know if it was a pile of "dung". We were all ready to write about "dung décor". We had owls that nested on a busy elementary school sidewalk and the school was always getting complaints to clean up the mess. So we had made them an educational sign about it that reads like this:

Nesting? Looks like a trash pile, doesn't it? But we do it on purpose!

This decoration is actually part of our wedding celebration. The dried plants, old feathers, dung and items you think of as trash is our way of saying we are committed to each other. It also warns other owls that this burrow is taken. Mrs. Owl may lay eggs about 10 days after our home is first decorated.

Scientists have studied to see if the dung that we line our nests with is to deter predators, attract bugs or help modify the temperature and humidity of the burrow. There are lots of good reasons for us to do it.

Early on, there was one small piece of trash that had been in view all day. We joked that James' was going to ask us to get rid of it. We would have to say no and prepare him for the mess that was coming. Past burrows have been decorated with gum and candy wrappers among other items. Just as we talked about it, in front of our very eyes, the male picked up the paper, turned it around and took the whole thing down into the burrow. We laughed! We felt as if he could hear us talking about it and didn't want us to take it away after he worked so hard to collect it and get it to their burrow.

More recently, they were working with a very big piece of trash (see pictures). We thought maybe it had blown there, but after looking at archived footage, we realized that the male had also brought it to the burrow. For such a small bird that was quite an accomplishment! After taking the paper whole into the burrow, the male and female have shredded it into smaller pieces. As they reshaped the burrow's opening and were digging, you may have seen pieces of it flying into the air. The male has also been seen shredding it into smaller pieces and using it to decorate the outside of the burrow. The good news is, since it is paper it will decompose rather quickly. So the owls are also helping to recycle and are also repurposing materials, what we call to "Trash to Treasure".

Owls with the Trash



Male stares at the trash



Holding the trash and checking it out



Male grabs the trash



Eating a bug from the trash



Male picks up the trash



Now she's got the trash



He's got the trash



Now she's got the trash



Holding the trash and checking the street



And she takes it into the burrow!

Dung Décor, Nest Lining and the Burrow's Microclimate

Since we thought there was a pile of dung at the burrow entrance, it was the perfect time to write about it. Burrowing owls collect a wide variety of materials to decorate the entrance to the burrow, the tunnel to the nest, and to line the nest chamber. The materials vary and may include: grasses, weed stalks, and feathers but the most common material is mammal dung. In 2004, Ryan Brady conducted a series of field experiments to test the function of dung in western burrowing owl nests in Idaho and tested the following hypotheses:

- a. Anti-predation: The scent of the dung deters terrestrial predators
- b. Optimal microclimate: Dung provides a better microclimate in the burrow by providing thermal insulation, reducing relative humidity and carbon dioxide levels
- c. Anti-ectoparasite: Dung reduces the flea loads on females and owlets ¹

Brady found the following results:

- a. There was no relationship between nest predation and the amount of dung
- b. Dung volume in the nest chamber tended to correlate with lower temperatures, higher relative humidity and lower carbon dioxide concentration
- c. There was no relationship between dung and flea loads on female or nesting owls ¹

The volume of dung in the nest chamber did not significantly affect mean temperature or relative humidity, but nests with more dung experienced smaller temperature ranges and lower carbon dioxide concentrations during incubation.¹ "Hatching success was not significantly affected by any of the four microclimate parameters (mean temperature, temperature ranges, relative humidity and carbon dioxide concentrations), but nest chambers that experienced larger temperature ranges during the early nestling period had nestlings with lower mass at 25 days of age. Productivity was significantly higher for nests with lower carbon dioxide during the early nestling period."¹

The Use of Dung as a Tool and the "Bait and Wait"

Also in 2004, another study was conducted on the Florida burrowing owl to see if the dung was being used to mask the scent of the nest from predators or were the owls instead using it as "bait" to "fish" for dung beetles.² Burrowing owls stand near their burrows for long periods of time and are one of the main predators of dung beetles. In the survival analysis of nests with and without dung, there was no difference in the time to destruction.² However; they found that when dung was present at the burrows, the owls consumed ten times more dung beetles. They also consumed six times more dung beetle species when dung was present compared to when there was no dung present. Doug Levey's team called this strategy "bait and wait"³ and they considered it a form of tool use. They compared it to tool use by herons, when they float objects like an insect or a feather to attract fish.

Levey says the fact that the owls are using dung as bait does not necessarily mean they are consciously plotting to catch beetles. The behavior probably evolved to benefit the owls without them knowing why. Bernd Heinrich, an expert on bird tool-use at the University of Vermont agrees. "The acts of putting down the dung and getting beetles are probably too far apart in time for the owls to reason it out."⁴

Dung Décor Indicates Burrow Occupancy but Definitely Increases Beetle Loads

In 2006, a third study was conducted on western burrowing owls and their use of mammal manure and it tested four hypotheses:

- a. Manure helps to attract mates
- b. Manure reduces nest predation by concealing the scent of the owls
- c. Manure indicates burrow occupancy to non specific and reduces agonistic interactions
- d. And manure functions to attract arthropod prey ⁵

Mark Smith and Courtney Conway found the following results:

- a. Males collected manure after pair formation so it is not used to attract mates
- b. Manure around a nest did not lower the probability of nest predation
- c. Burrow occupied hypothesis was supported but the results were not significant
- d. And pitfall traps collected 69% more bug or arthropod mass on burrows that had manure and the results were statistically significant ⁵

So this study also found that burrowing owls use mammal manure to attract dung beetles. It's like the owls are making a bug garden in their yard. Smith and Conway discussed some other hypotheses that need more work.

- a. Burrowing owls scatter other materials, but is that just a "collect and scatter" response, or does it serve the same purpose, and do the owls prefer manure
- b. Males scatter manure well before hatching so it may help incubating females
- c. Scattered manure is just a by-product of nest building, but the males continue to bring manure even after the clutch is complete, so it's function goes beyond nest building
- d. The nests with the most manure did not have more young, but it could have increased the conditioning of the young
- e. The bug garden may provide juveniles with experience handling prey near the safety of the burrow
- f. The bug garden may reduce the number or length of foraging bouts by adults with nestlings
- g. Manure may aid adult burrowing owls in acquiring carotenoids, which enhance immune function, females may compensate for carotenoid loss to egg yolk by eating manure ⁶
- h. Carotenoid levels are higher in arthropods and burrowing owls often switch from eating mammals to eating bugs just prior to breeding ^{6,5}

It seems there are still a lot of questions to be answered, but a dung garden makes complete sense.

"Bait and Wait" With Carcasses

So the dark pile we could see turns out not to be a pile of dung at all. Instead, it is the body of a baby bird, probably a Mockingbird. That seems normal. The owls are eating close to the burrow these days and getting rid of the scraps takes time. As time passes, the carcass gets buggy, especially if you leave it for more than a day. Now we are scouring the literature for references to burrowing owls and their use of carcasses to attract dung beetles, a "bait and wait" using carcasses instead of manure. Also consider that there is no nearby supply of cow or horse manure for these owls to work with. There seems to be no studies or references on this at all.

Then we find one! “Farther south, in Idaho, some burrowing owls reportedly stockpiled Great Basin spadefoot toads at the mouth of their nesting burrows.”⁷ We keep looking and imagine our surprise, when the descriptions we find are in the Bent Life History for the western burrowing owl. The Bent Life History is a series of monographs that were published by the Smithsonian Institution between the 1920s and 1950s! They provide colorful descriptions from very early American ornithologists. The reference that was related dates all the way back to 1894! Here it is:

“In addition to the usual materials mentioned above, these owls sometimes line their burrows with the remains of their food and a variety of other rubbish. Dr. Coues (1874) says, of a nest reported to him by Dr. C. S. Caufield: “In the passage leading to it there were small scraps of dead animals, such as pieces of the skin of the antelope, half dried and putrified; the skin of the coyote, etc.; and near the nest were the remains of a snake that I had killed two days before, a large Coluber P two feet long. The birds had begun at the snake’s head, and had picked off the flesh clean from the vertebrae and ribs for about one-half its length; the other half of the snake was entire. The material on which the young birds rested was at least three inches deep.”⁸

We’re always talking the owls in the evening. We watch them on screen until the darkness hides them from our view. We’re debating because we think if they take food down into the burrow it is a sign that they are feeding owlets. It seems counterintuitive to us that they would bring this type of material down into the burrow; unless it is being eaten. Clearly this is not true.

In front of our very eyes, the male is staring at the carcass. He stares at the carcass again. Then he picks it up, turns around with it, looks back, looks forward, drops it, picks it up, drops it again, picks it up and then carries it down into the burrow. He emerges not even a minute later. So they are lining a nest, of that we can be sure. They are lining their nest chamber with not only trash but the remains of carcasses, and so far, we have seen no dung at all!

With these owls, we have seen no collection of mammalian feces. But with the dogs walking by there must be some available but so far they don’t seem to use it. However, if you have been watching you may have noticed that the female uses the area of soil between the perch and grass to defecate. We have been calling it the “potty” spot and we have some “potty” pictures we have captured. Last weekend we also witnessed the female running over to her “potty” spot to grab an insect and eat it. This is visual evidence that it does attract insects that the owls do eat!

Last weekend we also saw the male with a black snake over a foot long. He ate some of it for breakfast until the Mockingbirds disturbed him, probably because he had raided their nest. This was a battle that spanned two days and went on for several hours. He sat on the top fence rail on Saturday and Sunday quarreling with the Mockingbirds; you may have heard the angry Mockingbirds in the background. We have one partial picture of a Mockingbird on the perch when the camera was zoomed out. The snake was taken into the burrow either to line the burrow or feed owlets. We aren’t sure which is true. Amazingly enough, the next day, the female brings out the rest of the snake and swallows the entire thing right in front of the camera! Obviously, the owls don’t mind aged carcasses! Does that mean they might eat “road kill” or carrion? Are they also recyclers of this kind? Another thing to research!

Male with the Carcass



Male stands by the carcass



Male picks the carcass up



Male looking at the carcass



Male looks to the right with the carcass



Male grabs the carcass



Male takes the carcass into the burrow!

Sources:

¹ Brady, Ryan S. 2004. Nest lining, behavior, nest microclimate, and nest defense of Burrowing Owls. Boise State Raptor Research Center, <https://raptorresearchcenter.boisestate.edu/brady-ryan-effects-of-mammalian-dung-in-burrowing-owl-nests-tests-of-alternative-hypotheses/>

² Levey, Douglas J., Duncan, R. Scot and Carrie F. Levins. 2004. Use of dung as a tool by burrowing owls. Nature, Volume 431, p 39. <http://www.readcube.com/articles/10.1038/431039a>

³ Chu, Jennifer. 2004. Burrowing Owls. Living on Earth Segments, <http://www.loe.org/shows/segments.html?programID=04-P13-00039&segmentID=3>

⁴ Hopkin, Michael. 2004. Owls use dung as bait for beetles. NatureNews, <http://www.nature.com/news/2004/040830/full/news040830-6.html>

⁵ Conway, Courtney J. and Matthew D. Smith. 2007. Use of mammal dung by nesting burrowing owls: a test of four functional hypotheses. Animal Behavior, 73, p 65-73. <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1580&context=usgsstaffpub>

⁶ Haug, E.A., B.A. Millsap, and M.S. Martell. 1993. Burrowing Owl (*Speotyto cunicularia*). In *The Birds of North America*, No. 61 (A. Poole, and F. Gill, eds.) The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, DC.

⁷ Lynch, Wayne. 2007. "Owls of the United States and Canada: A Complete Guide to their Biology and Behavior". Page 99. John Hopkins University Press. ISBN – 10:0801886872.

⁸ Bent Life History of the Western Burrowing Owl, http://www.birdzilla.com/birds/Burrowing-Owl/bent_life_history.html