

# Feeding North American Box Turtles

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Before I begin, I need to emphasize two points that are frequently forgotten when feeding captive box turtles:

1. Turtles eat food based on its visual, olfactory, and taste appeal. Do not rely on a turtle's willingness to eat something as an indicator of whether or not it is good or even safe for him.
2. Whether a healthy turtle is willing to eat food depends on many factors, not just on whether or not the meal is palatable (see p. 10).

North American Box Turtles (*Terrapene* species) are omnivorous in the wild, eating a wide array of animals (vertebrates and invertebrates), plants (primarily but not exclusively fruiting bodies), and fungi (some species of mushrooms or toadstools). We need to offer a balanced diet of both plant and animal origin that is not only appetizing but nutritious and in the right amount to sustain long-term good health, normal growth in juveniles, weight maintenance in adults, and results in [normal beak wear](#).



## DIET PLAN

The plan has two types of meals:

1. Prepared chow-veggie-fruit meals fed every other day (see p. 2)
2. Earthworms/garden snails/fuzzy mouse (fed every fourth meal as a replacement for the prepared chow meal (see pp. 6-7)

## Prepared Diet

### Ingredients

#### 1. Commercial Pelletized Chow

- [Omega One Adult Turtle Sticks](#) – (top choice) An aquatic turtle food that is excellent for box turtles. It is sold online (in sizes ranging from 3.5 oz to 10 lbs) and in some pet stores, including Petco but not PetSmart. A juvenile formulation appropriate for hatchlings is also available.
- [Mazuri Aquatic Turtle Diet](#) – An aquatic turtle food that is less expensive than Omega One and still fine for box turtles. Not all box turtles eat it well, so try a small container first. It's available online and in some pet stores

*Note:* There are many pelletized chows and canned diets on the market designed for aquatic turtles as well as a few purportedly designed specifically for box turtles. Some are of dubious nutritional value. I recommend you stick to the ones listed above. [For a review of commercial aquatic turtle diets, see theturtleroom.org.](#)

#### 2. Vegetable [select one or combine and vary over time.]

- Butternut Squash
- Carrots
- Yellow Squash
- Pumpkin
- Sweet Potato

#### 3. Leafy Greens [select one or combine]

- Dandelions
- Endive (Curly not Belgium)
- Redheaded Lettuce
- Romaine

#### 4. Fruit/Berry Topping [select one or combine and vary over time]

- Apple
- Berries (e.g., blackberries, blueberries, gooseberries, serviceberries, raspberries, strawberries)
- Stone fruit (no pits): peaches, apricots, plums
- Mango (save money: buy frozen chunked mango and thaw before serving)
- Papaya
- Persimmons
- Cantaloupe
- Opuntia (cactus) fruit; remove spines

#### 5. Supplements (buy both supplements)

- *Zoo Med* brand calcium powder **AND** *Rep-Cal* brand “Herptivite” Multivitamins

*Note:* You can purchase any brand of phosphorus-free calcium carbonate powder. I like ZooMed because it is finely ground and adheres well to food

I recommend using Rep-Cal brand vitamin powder, not Zoo-Med. ZooMed includes high levels of pre-formed Vitamin A whereas Rep-Cal only includes beta carotene as a source for this vitamin. The latter is safer to dispense in an amount unlikely to cause vitamin toxicity.

## Do I buy calcium powder with or without Vitamin D3?

Vitamin D<sub>3</sub> is inextricably linked to calcium metabolism. An animal that is Vitamin D<sub>3</sub>-deficient will *inevitably* become calcium deficient and develop [metabolic bone disease](#) regardless of how much calcium the animal ingests. However, turtles make all the Vitamin D<sub>3</sub> they need when exposed to adequate amounts of *unobstructed* sunlight (note that the essential wavelengths of light that cause Vitamin D<sub>3</sub> formation are *blocked* by glass or plastic/acrylic).



Turtles housed indoors make enough Vitamin D<sub>3</sub> to meet their needs if they are kept in the appropriate temperature range (to stimulate their metabolism) and are exposed to adequate levels of ultraviolet radiation in the 290 to 320nm range, commonly called UVB. I recommend using [Arcadia](#) brand or [ZooMed T8 ReptiSun® 10.0 UVB](#) linear fluorescent lights (never coil lights produced by ZooMed and other manufacturers) or [Mega Ray](#) mercury vapor lights. To be effective, these lights need to be carefully placed and periodically replaced according to the manufacturer’s instructions. It is not enough that the habitat is simply “lit up”. Please read the Arcadia and Mega Ray (ReptileUV) websites carefully, as they include valuable information on reptile lighting needs.

If a turtle ingests too much calcium supplemented with Vitamin D<sub>3</sub>, the animal may ultimately suffer severe health consequences related to excess calcium accumulation (due to the fact that Vitamin D<sub>3</sub> promotes calcium uptake). Therefore, I recommend the following:

- For box turtles that live outdoors year-round use calcium carbonate **without** D<sub>3</sub>.
- For turtles that live outdoors in the summer but are mostly housed indoors through the winter months with adequate exposure to full-spectrum lighting (UVB light) use calcium carbonate **without** Vitamin D<sub>3</sub>.
- For turtles living indoors year-round with adequate UVB exposure and an appropriate living temperature use calcium carbonate **without** D<sub>3</sub>. (For information on temperature requirements for box turtles, see “[Indoor Housing](#)”.) To determine if your lighting is adequate, I recommend purchasing a [Solarmeter® Model 6.5R Reptile UV Index Meter](#). To interpret the meter readings, consult with this [guide](#). (North American Box Turtles are in Ferguson Zone 2.)
- For turtles living indoors with insufficient UVB exposure, it may not be possible to meet 100% of your turtle’s Vitamin D<sub>3</sub> needs through oral supplementation. Not all reptiles efficiently uptake oral Vitamin D<sub>3</sub>. My recommendation is to upgrade your lighting!

## Preparation

Make up enough topping and hydrated chow to last 3 meals; store separately in lidded containers in the fridge.

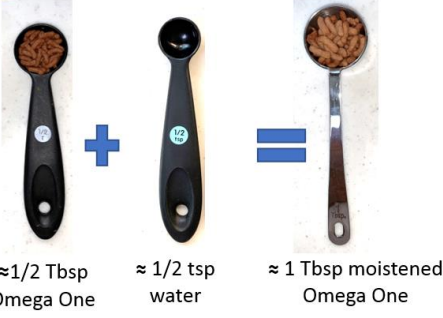
Although an amount is stated for each ingredient, it’s approximate. Measure once, and then do it “by feel.” Some turtles clean their plate at every meal; others nibble at one meal and eat heavily at the next. It varies.

You may need to increase/decrease the total size of the meal depending on the age, size, and activity level of your turtle.

## Steps to Preparing Diet

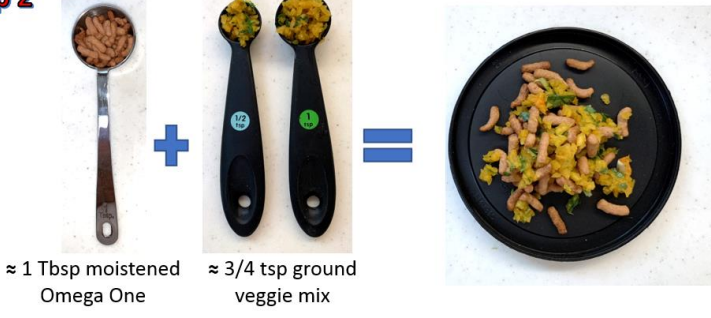
**Box Turtle "Omega One/veggie/fruit" Meal**

**Step 1**




≈ 1/2 Tbsp Omega One + ≈ 1/2 tsp water = ≈ 1 Tbsp moistened Omega One

**Step 2**



≈ 1 Tbsp moistened Omega One + ≈ 3/4 tsp ground veggie mix =

**Step 3**



once a week ≈ 1/4 tsp minced cooked turkey, chicken, or liver + + crouton's worth of seasonal fruit + light dusting of vitamin or mineral supplement (alternate at every meal) =

Ready to eat!!

The symbol "≈" means "approximate."

### Step 1

1. For one meal for one turtle use approximately 1/2 level tablespoon dry chow and approximately 1/2 teaspoon water. Multiply these amounts for additional turtles.

*Note:* 1/2 tablespoon Omega One ≈ 2.5g, 1/2 tablespoon Nasco ≈ 4.5g.

2. Add dechlorinated water to dry chow (do not use distilled or RO water) at a ratio of approximately 3 parts chow to 1 part water. (Use a lidded container so the chow hydrates rapidly and evenly.) After adding the water gently stir, or tilt and rotate, the dish to distribute the water over all the chow so 100% is in contact with water. Otherwise only some of the chow will be hydrated and the rest will remain dry. Cover the container and wait around 10 minutes. The end result should be *slightly* soft, NOT mushy nor hard.

### Step 2

1. For one turtle, use approximately 6g vegetable and approximately 10g greens. Multiply these amounts for additional turtles.



2. Grind the vegetables and greens together into ***tiny bite-size pieces*** using a food processor. Do not puree. Your turtle won't eat it! *Do not cook any of the produce.* Serve it raw. However, if you hand chop butternut squash (which is very hard), consider microwaving it a few seconds to slightly soften it. A food processor can cut the pieces small enough for a box turtle to eat raw. Alternatively, finely grate the vegetables and finely mince the greens.

*Use a food processor (I recommend [Hamilton Beach Stack & Press Mini 3-cup processor](#)) to grind up the vegetables and greens. It makes preparation of enough food for five days (three meals) a snap and creates tiny food pieces that are easily swallowed by a turtle. It also discourages the turtle from being picky.*

### Step 3



1. Combine by hand the pre-moistened chow and veggie/greens mix. Do not use a food processor.
2. One a week, add ¼ tsp boiled or broiled plain chicken or turkey, skin removed, or liver, for extra aroma, flavor and protein, and for Vit A in the liver. Mince finely, and mix well with the meal. Add a little calcium powder to the meat before putting it in the meal since the meat is naturally calcium-poor.
3. Add a crouton's worth of seasonal fruit. Do not grind it up; serve in chunks or whole on top of meal.
4. Lightly dust the meal with a supplement – alternate between vitamin and calcium supplement at each meal (i.e., one meal vitamin, next meal calcium, next meal vitamin, etc.). *Note* – a little is good, a lot is not! Use a tea strainer, lightly tapped, to sprinkle the supplement onto the diet, as if you were dusting powdered sugar over the top of a cupcake

### Common Mistakes in Diet Preparation

- ☹ Chow is not properly hydrated. All water should be absorbed but the chow shouldn't be mushy. If you have water left over, you added too much water; never decant off water; it only sends nutrients down the drain.
- ☹ Chow is served dry straight out of the container. *Never serve chow dry* – it can get stuck in the incomplete palate, cause GI track impactions and hinder establishment of a positive water balance. (In the wild, box turtles naturally eat a diet with high water content; dry chow is too dry!)
- ☹ Greens are not chopped up finely enough. Many box turtles do not like leafy greens; others relish them. To make sure your turtle eats them, chopped them up finely enough to stick to the food they find appealing.

☹️ The meal is pureed into mush. Look at the picture of the turtle eating the diet at the beginning of this article as well as the preparation picture above. The diet is ground up/minced into bite-size pieces. Aim for this in preparing the diet to make it appealing to the turtle.

☹️ Excess diet is stored improperly. You can store the vegetable/leafy green topping and the hydrated chow (separately) up to 5 days in an airtight container in the fridge. DO NOT FREEZE it! It will turn into unappetizing mush that your turtles will reject.



### **Live food, meat and mice**

For every fourth meal, feed a meal of **EARTHWORMS** (Canadian Nightcrawlers) or garden snails – as many as the turtle will eat. My adult turtles usually will eat 3-4 big nightcrawlers or 2-3 big garden snails at one meal. (Worms are commonly sold at many Super Wal-Mart outlets but also available in bait/hunting stores.) Red wigglers and compost worms are perfectly fine too but I find most box turtles reject them.

Do not just drop invertebrates in front of your turtle or add them to the substrate as “future meals” and walk away. Box turtles are sight-feeders. An earthworm that burrows into the substrate out of view doesn’t exist as far as the turtle is concerned. He won’t dig for worms when hungry although he will eat them if he just happens to unearth them while digging in the substrate for other reasons.

Earthworms are quite different from mealworms, supermealies, and waxworms. The latter three invertebrates are insect larvae, not true worms. (Mealworms and supermealies become beetles; waxworms become moths). Unlike earthworms, which are annelids, nearly all insects have low calcium content and a negative calcium to phosphorus ratio. In small amounts they are fine to offer as treats – most box turtles love them – but a steady diet will interfere with calcium absorption and result in bone demineralization, possibly leading to [Metabolic Bone Disease](#). This can happen especially quickly in young growing turtles with high calcium requirements. If you feed commercially raised insects (e.g., mealworms, supermealies, house crickets) feed them T-Rex Calcium Diet (you will need to grind it up into a powder) for 72 hours before feeding the insects to your turtles. This diet is only sold online. Offer water on cotton balls as a moisture source while feeding T-Rex, and nothing else. Also dust the insects with calcium powder (Rep-Cal, ZooMed) immediately before serving.

**SOLDIER FLY LARVAE** are the exception in the insect world in having a naturally positive calcium to phosphorus ratio. They are a great addition to a turtle’s diet. These larval insects can be purchased online.

**PILLBUGS** (also known as sowbugs, roly pollies, woodlice) are terrestrial isopods; they are not insects. They are nutritious, calcium-rich, and a welcome addition to your turtle’s diet. Pillbugs are easily [cultured](#) in a small container, and supported in outdoor habitats (including your turtle’s living space) if you have moist conditions and rich organic substrate. Add moist leaf litter and it will become populated with pillbugs. Young pillbugs are quite tiny; the perfect size for hatchling box turtles.

Another naturally occurring creature in your garden that is nutritious for box turtles are **GARDEN SNAILS** (the entire snail). Just be sure no pesticides have been used on plants that the snails could have accessed.

Several times a month, offer a frozen-thawed **FUZZY-STAGE MOUSE** (“pinkie-stage” is O.K. but has a negative calcium to phosphorus ratio, so is not optimal). Fuzzies can be purchased frozen at many pet stores or less expensively in bulk online. Thaw one for a few minutes in tepid (not hot) water to bring it to room temperature before feeding it to your turtle. Never serve a mouse refrigerator-cold. Also never microwave a rodent to thaw it out or warm it. It can result in dangerously high internal temperatures even if it feels barely warm to the touch on the outside. Rodents frozen more than 3 months or with obvious freezer burn should be discarded. Do not feed live or freshly killed mice. They may carry parasites transmissible to your turtle. Freezing kills the parasites.

*Do not dust earthworms, snails, or fuzzy mice with calcium powder. Lightly dust pinkie mice.*

## **Foods to avoid or limit**

- ☹ Do not feed cat food, dog food, hamburger, cold cuts, fried anything. Turtles can develop a variety of problems from these foods, including gout from the high protein content, soft tissue mineralization from excesses of calcium and vitamin D3, and fatty liver syndrome – a life-threatening condition – from excessive fat content. Cat food is designed to maintain the urinary health of a cat by acidifying its urine and preventing calcium deposits from forming and blocking the urinary track. When fed to turtles, cat food can demineralize the bones resulting in severe deformity in growing turtles and other health issues in both juveniles and adults.



- *Note:* Cooked chicken is often a successful way to deliver oral medication to a box turtle if they otherwise refuse to swallow it and if you do not have the means or experience to tube the drug directly into the animal’s stomach using a ball-tip syringe or catheter.

- ☹ Avocados – they contain persin, a chemical toxic to birds and likely reptiles too.
- ☹ Bananas – most box turtles LOVE bananas, and an occasional bite-size treat will do no harm. (For many box turtles, they make the perfect food in which to hide medication because bananas are so irresistible!) But they are high in sugar, high in potassium, and have high levels of phosphorus which can inhibit calcium absorption. Also, they are filling, and if served in quantity, can discourage a turtle from eating other more nutritious parts of a meal.
- ☹ Watermelon – it won’t hurt to feed this now and again, but it has a fairly high water content (filling) and lower nutritional value than other fruits/berries included in my recommended diet
- ☹ Citrus fruit (*lemons, oranges, limes*) – these fruits contain citric acids which can irritate the stomachs of reptiles, resulting in stomach upsets, vomiting and diarrhea if eaten in large enough volume. I feed kiwi fruit and tomatoes (also acidic) but do so in moderation and have never had a problem.
- ☹ Cruciferous vegetables (cabbage, kale, Brussel sprouts, and broccoli) – this group of vegetables is high in goitrogens. Goitrogens inhibit the absorption of iodine which over prolonged periods may lead to a condition known as hypothyroidism (underactive thyroid). Symptoms of hypothyroidism include lethargy, bloat, slow growth, and can eventually prove fatal.



- ☹ Legumes (beans, peas) – Most are high in purines, which can cause gout when eaten in excess. Best just to avoid them.
- ☹ Mealworms, Supermealies, Waxworms – See discussion in previous section.
- ☹ Iceberg Lettuce – It is too lacking in nutrients to be worthy of adding to a turtle’s diet. Choose better greens from the list on p.3.

## Cuttlebone

Cuttlebone is the hard, internal structure found in cuttlefish, a marine invertebrate. It is composed primarily of aragonite, a crystal form of calcium carbonate. It is a good supplementary form of calcium for turtles.. In my experience, adult box turtles rarely show any interest in cuttlebones but most young juveniles relish them. I always put it in habitats occupied by juvenile turtles. Most hobbyists recommend removing the hard backing before offering cuttlebone to their turtle. It can be accomplished relatively easily if the cuttlebone is first soaked for a few hours in tap water, and then the backing cut away with a knife or razor blade.



Juvenile box turtles as well as some adults eagerly eat cuttlebone, an excellent source of supplemental calcium. But you will still need to dust your diet with a calcium supplement. And if your turtle lives indoors with fluorescent lighting, the calcium supplement must be Vitamin D<sub>3</sub> fortified.

### **Should I wean a turtle off his old diet slowly while introducing the new diet?**

No. I have rarely known what specific foods turtles were eating before I received them. I have just offered them the diet outlined below and they have usually begun eating it within a few meals if not right away. I have never noticed any gastrointestinal distress associated with this abrupt diet change. However, if your turtle appears very picky when offered the new diet, smear a *small* amount of whatever he/she likes into the new food to encourage eating for the first few meals. Alternatively, try adding a big pinch of warm meat (boiled/broiled chicken, turkey) to attract the turtle to the food. Be sure to mince the meat finely and mix it with the food or the turtle will just pick it out and eat it. You can also mince up an earthworm and add it to the meal.



## How often should I feed my box turtle?

Feed older juvenile and adult turtles every other day. If they live outdoors, be flexible. You can't blindly follow an every-other-day schedule outdoors; the weather is going to be variable. Feed as soon as inclement weather lifts.



These are general guidelines. Weigh your turtles twice monthly and keep a record. You may find that alternate day feedings work for some turtles while others need daily feeding to maintain good weight.

## How long should I give my turtles to eat before removing the food?

Undisturbed, a box turtle usually eats a meal in a few minutes. Although I would assume box turtles can handle a higher level of bacterial contamination in their food than humans (after all, they eat carrion – dead animals – in the wild), I don't know what their upper tolerance is. Never leave food in a pen overnight. It's an invitation to unwanted insects, rodents, and larger mammals that would also be happy to eat your turtle. If you have a problem with ants invading the food dishes, one solution is to feed on heavy saucers placed on a plastic cafeteria-style tray filled with water.

You should watch your turtle eat at least some of its food so you can assess its appetite, and also know that it has fair access to a meal (i.e. that another turtle or some other creature – pest or pet – is not eating it). Be aware that some turtles are VERY shy and will not eat while you peer right down at them. Move away briefly if needed.

## Feeding tips

- ✓ Serve the meal at room-temperature. Chilled food drops the core temperature of an ectothermic (cold-blooded) animal, such as a turtle, and slows metabolism. Cold food also is less appealing since it has less fragrance than room-temperature food.
- ✓ Mist the habitat before feeding. Box turtles often become active shortly after it rains. If your animals seem sluggish and uninterested in eating, try misting their enclosure just before feeding.
- ✓ Feed first, clean later. Cleaning a habitat or otherwise fussing with things just before or during mealtime can leave a turtle feeling nervous and suppress its appetite.
- ✓ Feed turtles in the habitat where they live. Some turtles don't mind being placed in a separate feeding container. But most turtles are far too nervous to eat in a novel environment, or to eat just after having been handled (other than to turn them around in place to face the food dish).
- ✓ Feed turtles in a safe place. Some turtles don't mind eating out in the open, but many eat far better if fed under a plant (fake or real) that makes them feel less visible to potential predators and pen mates. This is particularly true of small juveniles that have many predators as wild animals and like to keep hidden. Remember, your turtle is a wild animal at heart; it just lives in captivity.
- ✓ Feed turtles on a surface that is easy to eat from. Don't make eating hard! A flat or very low sided "dish" like a butter tub lid or plastic sandwich box lid works well (see picture at the beginning of this article). Use a dish that can either be thoroughly washed before reuse (I don't recommend rocks or wood, which are porous, for this reason), or use a disposable paper plate. Some turtles eat white paper plates, especially juveniles, so try to find something in soft plastic, resin, or ceramic. Do not use disposable plastic lids that come with take-out cold and hot drinks. Your turtle can bite through them.
- ✓ Feed each turtle separately. Some turtles will eat well alongside other pen mates of comparable size, but many won't. They either get aggressive or cower and walk away without eating their fill. It has nothing to do with the amount of food available. Turtles will walk right over a dish of food to steal

food from another turtle. Try to feed turtles so they are not facing each other or are close together. This is especially important with hatchlings and young juveniles that can get very aggressive at feeding time, biting (and injuring) the face, feet, and tail of fellow pen mates.

## Special feeding tips for outdoor turtles

- ✓ Be prepared to adjust the feeding schedule to take into account the weather. There is no point in feeding outdoor turtles if a cold front is moving through or it's pouring rain. Feed as soon as the weather breaks. This is what turtles do in the wild. They eat when it's warm (not super hot) and don't eat when it's cold or inclement. If it gets cool at night, feed mid-morning just when it starts to warm up.
- ✓ Consider wetting the area just before feeding to encourage eating. Turtles may show a decline in appetite when very hot and dry. They are often ready to eat right after it "rains" on a warm day.
- ✓ Don't worry about tapering off the frequency of feeding before hibernation. Outdoor turtles know when to stop eating and will naturally show a diminished appetite as fall progresses and temperatures drop. They should resume eating within a couple of weeks of emerging from hibernation in the spring if the weather "cooperates." Some springs are exceptionally cool and variable in temperature and your turtles' appetite may be suppressed. It's natural but be on guard for any signs that your turtle may be ill from prolonged inappetence. (See pp 95-107 of [The Box Turtle Connection Building a Legacy](#)). In the early spring and in the fall when appetites may be depressed, turtles may not be interested in a prepared chow-veggie-fruit diet. Try adding in 1/4 heaping teaspoon of warm, cooked, ground-up calf liver dusted with calcium powder in the chow diet. The liver will provide a bolus of preformed Vit. A. If the turtle still refuses to eat a prepared diet, consider substituting earthworms or a frozen/thawed (to room temperature) fuzzy mouse (not a pinkie mouse, which has a poor calcium content) once every week to 10 days during this cool transitional weather.

## The food may not be the problem

Sources of physical and/or emotional stress can cause poor eating. These include basically everything impacting the turtle's world, such as pen enrichment, substrate material and moisture level, microclimate, photoperiod and lighting, interactions with other animals, degree of people activity, and the level of noise/vibration in the area, and how much the turtle is handled. The list is long and beyond the scope of this article. For specific questions, please contact the author at [boxturtlefacts.org](http://boxturtlefacts.org).

An overgrown beak can also interfere with eating; it isn't just cosmetic. (See [Beak and Claw Care](#).) If your turtle has an overgrown beak, have it trimmed by a qualified veterinarian who routinely sees chelonians as part of his or her practice. Diet alone will not reshape a badly overgrown beak, nor will the addition of cuttlebone to the menu. Cuttlebone is a good source of supplemental calcium to the diet, but contrary to popular belief, does not substantially contribute to grinding down or maintaining good beak length and shape.

Animals that are ill, injured, dehydrated, have a heavy load of gut parasites, or are nearing oviposition (generally the last few weeks to a month before laying eggs) may show a decline in eating. Animals with

gut parasites may also eat well and yet remain chronically underweight. Check with your veterinarian if you suspect a health problem.

### Too much of a good thing

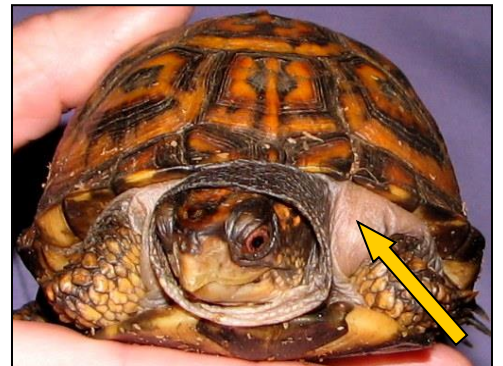
On the other end of the spectrum from the fussy eater is the box turtle that will eat anything put in front of it. While it may be tempting to feed a “good eater” extra-large meals, be careful about allowing your turtle to eat to the point it becomes obese, appears to be “stuffed” into its shell, and can no longer close up its shell. Not only will your tubby turtle be more vulnerable outdoors if it cannot box up, but the animal will likely suffer internally from health problems.



*Severely underweight*



*Good weight*



*Severely overweight*

### I've decided to overwinter my turtle indoors. Do I need to feed him?

Yes, and with the same frequency and in the same amounts as in summer! To succeed, the turtle must be kept in summer-like conditions (in terms of temperature, humidity, and diurnal cycle) in a properly enriched indoor enclosure. If you simply put your turtle in a cold room or garage, your turtle may die and at the very least will not overwinter unscathed. The animal may be too cold to move much but it isn't in a true torpor and is just spiraling downhill in terms of its nutritional status, water balance, and overall health.

### What about feeding hatchling and juveniles?

Hatchlings and young juveniles have different dietary requirements and feeding environments than older animals. This topic will be covered in an upcoming addendum to this paper. In the meantime, feel free to contact the author at [boxturtlefacts.org](http://boxturtlefacts.org).