# *Raising Waxworms as Food Insects for Birds and Reptiles*

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Wax worms are the larvae or caterpillars of the wax moth. They are a pest in beehives and can sometimes be obtained from a beekeeper when they have infested a hive. There is a greater wax moth *(Galleria mellonella)* about 1 inch and a lesser wax moth *(Achroea grisella)* about 1/2 of an inch in size. Their larvae grow to about 1-1/3 in. and 3/4 in. respectively, before they pupate. The greater wax moth appears to be easier to be cultured.

The larvae are raised in shallow, plastic storage boxes with a large metal fly screen window in the lid to allow for good air circulation. A useful sized container is 12 x 7 x 4 inches high (1 gallon or 4.4 l). The opening in the lid should be as large as practical, but by leaving a good rim for gluing in the screen with a hot glue gun. The hatching container should have very fine screen while the rearing container can have metal fly screen. The food medium is filled about one inch deep into the container and larvae are added. They mature in the growing container until pupating.

For the hatching container we can use small, round steel screens, which are sold for fuel funnels, to be glued into the lid of a smaller the hatching container approximately 10 x 6 x 2 in. high plastic storage box. The larvae are kept in these hatching containers until they have grown to a size too large to pass through fly screen, and then the contents are transferred to rearing containers described above.

A piece of paper towel is used to line the hatching container and a 3/4 inch layer of food medium is added with a small piece of tissue placed on top. The eggs are spread on the tissue paper. This allows us to monitor the hatching of the eggs. The egg cases become transparent when the invisible (to the naked eye), minute larvae hatch and migrate to the food medium. It may take two to three weeks before they become evident in the culture, so be patient.

Wax moths and their larvae prefer darkness and warmth. This can be useful in keeping the tiny, young larvae in the container by placing a light source above it and at the same time give warmth to the culture. (See "brooding cabinet" below).

All screens must be metal since the larvae will chew through plastic fly screen in short order when they run out of food or approach the pupating stage. A well populated culture will generate a surprising amount of heat on its own, hence the great need for ventilation. The optimal rearing temperature is 27-29 °C.

More food may have to be added, depending on the number of larvae. The larvae grow rapidly once they reach a certain age and begin to wander around on the surface just before pupating. If food is short in supply the larvae will also begin to wander around in the container and *out* of the container if they find an opening. The fully grown larvae like to pupate under the lid near the vent opening. If too many larvae block the air screen, then some need to be removed. 30 moths are sufficient to generate thousands of eggs for the next generation. Food shortage will trigger premature pupation and smaller bodied moths might hatch. The emerging moths do not require special feeding, since they will begin to mate and lay eggs immediately and perish within about 2 to 3 weeks. The eggs are deposited in small patches near the lid of the container. The greater wax moth lays up to 800 eggs (the lesser moth up to 300) eggs. The moths try to deposit the egg masses in tight cracks and use the margin between the lid and the top rim of the plastic container to deposit their eggs there in strips. The strips of egg masses can be scraped off with the fingernail or the back pocket knife and divided up for several new cultures. Several batches of eggs can be harvested from the same container for several days.

The cycle from egg to egg is about 6-7 weeks at 28 °C and up to 3 months at room temperature. By propagating starter cultures at various temperatures, we can achieve a staggered effect, to have a more continuous supply of larvae.

One must manage the cultures responsibly, to prevent any unnecessary escapes of the insects, so as not to cause unnecessary bee hive and bumble bee nest infestation. Both moth species do, however, occur in the wild and invade bumble bee nests and honey bee

hives. Fortunately the insects can be cultivated year around like mealworms. Larvae can be taken at different times depending on the size of food animal desired. By keeping maturing cultures at lower temperature the metamorphosis is delayed, which extends the harvesting and storage time.

The author developed a simple and suitable food medium as follows: mix by volume 5 parts of poultry starter with 2 parts mixed baby cereal, 2 parts of wheat bran and 1 part wheat germ. Warm up 3 parts of "liquid" honey in a hot water bath to about 35°C and mix the dry ingredients with the honey to produce a moist crumbly texture. It is best to use a plastic pail or large bowl and a sturdy wooden spoon to mix the ingredients. Unused mix can be stored for a long time. "Liquid" honey is usually less expensive and sold in bulk containers for baking, etc. This type of honey is best suited since it does not crystallize as quickly, turning the medium into a solid mass. Larvae can not feed on dry solid food mixes. To avoid this, glycerin can be added by stirring it into the heated honey at a ratio 1 to 10 parts of honey. The dry ingredients can be changed in proportion. The honey is really the key component and the primary food source to the larvae. It is better to have the mix on the moist side than on the dry side by increasing the honey component. High levels of wheat bran are questioned by some due to the potential effect of binding calcium in the food chain.

An older formula is as follows: 250 g honey, heated to 35 °C; 250 g glycerin; 1 pkg. beer yeast, dissolved in 1 tablespoon lukewarm water with ½ teaspoon of sugar; 100 g wheat germ; 100 g powdered skim milk; 750 g wheat bran; 250 g oat meal. Mix the warm honey and glycerin together. Mix the dry ingredients and add the liquid ingredients. Knead the mix until it becomes a moist crumbly mass.

One might experience problems with drying out of either of the above mixes. The larvae can not consume dried-out food mixes. New moist media can be added to the container at any time if necessary. If one wishes to feed surplus moths, it works best to place the container in a refrigerator to make the moths go sluggish, which can then be picked out by hand or with forceps. This is also helpful when eggs are removed, to keep the moth docile. The container which had breeding moths usually has numerous eggs in the medium (although most are placed at the rim) which can be saved by adding new food mix to the container. The eggs will hatch and turn into another batch of larvae in time, but usually the larvae are of different sizes, resulting in problems of harvesting the larvae while some have pupated and others hatched into moths which escape when the container is opened. It is best to work with equal-aged batches of wax worms. Cultures need to be checked periodically so they do not run out of food.

Condensation in the container must be avoided as mold will develop, which can inhibit and kill the culture. This often develops when the medium has become warmer than the ambient room temperature and condensation forms on the inside of the container. The containers should always be returned to the brooding cabinet as soon as possible. A paper towel can also be placed so to form an inside lining inside the container with the medium placed on it. The paper will absorb most of the condensation.

The pupae are spun into cocoons which have a small opening slot at one end. Starting at this end the cocoon can be pulled apart and the brown pupae removed. Most birds relish these and even feed them to their newly hatched chicks. Harvesting pupae is time consuming but it offers important insect food that is alive and immobile. We need this to bridge times when we are unable to provide the parent birds with live food of those species which must have a periodical, ongoing supply of live food for the rearing of their chicks.

Once the procedures are worked out wax worms/moths can be raised as easy as mealworms.

**A Word of Caution.**

Escaping larvae are a problem in a home. They will invade dark places and pupate in crevices. Usually they widen the site for pupation and chew a depression into wood, books even plastic and other materials. Moths will emerge in time as well. If the larvae (or moths) are fed to birds or reptiles they should be fed for immediate consumption or freshly killed.

Breeding colonies are best maintained in an out-building by placing them in a brooder cabinet built for the purpose. This is effectively a big insulated box with doors that have vent slots. It should be insulated to conserve energy and can be heated by at least two light bulbs, as an assurance if one burns out, to maintain temperatures. An inexpensive thermostat, used for base board heaters, can be patched into the electric feed to balance temperatures and save energy.

The cabinet can also be used for raising crickets and mealworms. A broken down fridge may be a good unit because of its insulation and ease of cleaning. A screened vent opening, about 3 by 6 inches, should be cut into the door. It should have a sliding cover or some means to reduce the opening to balance air flow and heat loss. Shelves allow to select levels of varying temperatures. The warmest being at the top. Such a unit can also accommodate other insect cultures, i.e., mealworms and crickets.

The author experienced in some instances problems with feeding high levels of wax worm in diets for chick-rearing parents (Pekin Robins). Wax worm have low levels of minerals and high levels of soft-tissue building nutrients, this may result in rickets and mineral deficiencies in the chicks. Other insects such as crickets and mealworms and mineral supplements must be fed in addition. Softbill birds show preference for wax worms which must be watched to avoid one-sided diets. ❖