

# From Hatch to Harvest: The New Food Frontier

**Grade Level: 4-8**

## Lesson Overview

The eating of insects, entomophagy, is practiced in many countries. Insects have a high protein, vitamin and mineral content. The farming of insects takes very little use of natural resources. For these reasons, the practice of entomophagy is considered one of the solutions to feeding the world as the population grows.

## Student Objectives

1. Understand why entomophagy may be a food of the future
2. Create an imaginary product containing insects
3. Create packaging and advertisement for the product
4. Share with the class.

## Materials

- ✓ Entomophagy information sheet
- ✓ Entomophagy worksheet
- ✓ Wi-fi usage

## Vocabulary

- **entomophagy**- the eating of insects and arachnids as food.
- **insects** - member of the largest class of the phylum Arthropoda. Insects have segmented bodies, jointed legs, and external skeletons (exoskeletons)
- **larva**- (plural larvae) is the juvenile form of an insect. Different types of insects have other names for their larvae, for example, caterpillars are the larvae of butterflies and moths. For insects that undergo incomplete metamorphosis the larvae are also called nymphs.
- **exoskeleton**- An exoskeleton is the external skeleton that supports and protects an animal's body, in contrast to the internal skeleton of, for example, a human. In usage, some of the larger kinds of exoskeletons are known as "shells".
- **farming**- the activity or business of growing crops and raising livestock
- **minilivestock** - encompasses small indigenous vertebrates and invertebrates which can be produced on a sustainable basis for food, animal feed and as a source of income. It includes bush rodents, guinea-pigs, frogs, giant snails, manure worms, insects and many other small species. Mini-livestock production

is suitable for backyard family production and can contribute to increased food security.

- **molt**- shedding of the exoskeleton to grow

## **Background Information**

Please see information sheet.

## **Procedure**

1. Brainstorm how the projected 9 billion people will be fed in 2050.
2. Teacher will ask if students have heard of entomophagy?
3. Give each student a piece of chocolate/ask if they've ever eaten chocolate if food not allowed in classroom. Ask if the students have ever eaten a bug. Share with them the fact that USDA allows 60 bug bits in a 3.5 oz chocolate bar. Another choice for food would be insect shaped graham crackers. (Containing cinnamon which is allowed 400 insect parts per  $\frac{1}{4}$  cup)
4. Teacher will show students one of the recommended videos concerning entomophagy.
5. Students will read the Entomophagy Information Sheet
6. Students will work in pairs or groups to do further web research with the goal of creating a new edible insect product.
7. Students will create an edible insect product, packaging for the product and a promotional activity (commercial, flyer, etc.).
8. Students will share with class their projects.

## **Extension Activities**

1. Student projects could be shared with other classes or parent groups.
2. Students can create a Venn Diagram comparing minilivestock to traditional livestock (cows, sheep, pigs, chickens, etc.)
3. Class experiment tasting various bug foods, which were purchased by teacher at <https://www.edibleinsects.com>

## Additional Resources

- Student worksheet- Venn Diagram comparing minilivestock to traditional livestock.
- *Diet for a Changing Climate Food for Thought* by Christy Mihaly and Sue Heavenrich ISBN-9781512481211
- <https://youtu.be/eTN3Vzo1Afc> Black soldier fly farmed by Enviroflight, world population driven
- <https://youtu.be/rDqXwUS402I> Explanation of eating bugs
- <https://www.edibleinsects.com> site for purchasing bug products also good site for students to do research, as many different articles available on the subject of entomophagy
- [https://time.com/5942290/eat-insects-save-planet/?utm\\_source=facebook&utm\\_medium=social&utm\\_campaign=time-2030&utm\\_term=&linkId=112491563&fbclid=IwAR3n3YsUUFm87B0u5v7kZtOkHhruxhubeDKb3Wun88O2iAeLhYFD8sYPGI](https://time.com/5942290/eat-insects-save-planet/?utm_source=facebook&utm_medium=social&utm_campaign=time-2030&utm_term=&linkId=112491563&fbclid=IwAR3n3YsUUFm87B0u5v7kZtOkHhruxhubeDKb3Wun88O2iAeLhYFD8sYPGI) *Time* article “They're Healthy. They're Sustainable. So Why Don't Humans Eat More Bugs?”

## Standards

### ***Illinois Social Science Standard***

SS.G2.6-8.MC Evaluate how cultural and economic decisions influence environments and the daily lives of people in both nearby and distant places.

### ***Illinois English Language Arts Standard***

W3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

The **M**ultidisciplinary **A**gricultural Integrated Curriculum (mAGic) was created in 2004 under the leadership of the Illinois State Board of Education (ISBE) and the Facilitating Coordination in Agricultural Education Project (FCAE). Funding was made available through the FCAE grant budget from the agricultural education line item of the ISBE budget. This revision, as printed, was developed in April 2021.



These mAGic lessons are designed to bring agriculture to life in your classroom. They address the Illinois Learning Standards in math, science, English language arts and social studies.

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## Entomophagy Information Sheet

Entomophagy is the practice of eating insects. Over two billion people around the world practice entomophagy by harvesting and eating more than 1900 different insect species. Insects are said to be delicious, with tastes ranging from sweet to nutty. Many cultures have been eating insects for centuries. Insects are sold in markets and restaurants, especially in Cambodia, Thailand and Vietnam. Some restaurants serving insects are even found in the US and Canada.

Insects have a very high nutritional content. As shown on the chart below, insects are very high in protein, vitamins and minerals, yet low in saturated fats. Many of these insects are comparable in proteins to the animals eaten by many humans, yet much lower in saturated fats.

Nutrients (per100 grams/3.5 ounces of different insects and meat)

<b>Insect</b>	<b>Protein</b>	<b>Fat</b>
Cricket	12.9	5.5
Grasshopper	20.6	6.1
Giant Waterbug	19.8	8.3
June Bug	13.4	1.4
Mealworms	2.7	5.4
<b>Animal</b>		
Chicken (skinless)	21	3
Beef	26	11.7
Wild Salmon	19.8	6.3

Producing insects in a controlled setting is called farming. Raising insects (mini-livestock) uses fewer natural resources than the raising of pigs, beef cattle or chickens. Since cricket farming can be done with little or no land, the farmer does not need to be a landowner. The crickets can be housed in bins that are stacked upon each other. They need very little food or water. The time from hatch to harvest is only about a month. During that time, the crickets will molt 8 times. It is the goal of the farmer to harvest the cricket just before the last molt so the exoskeleton isn't too thick and hard to chew. To harvest the crickets, they are usually frozen.

Crickets have been farmed, then ground up and used as cricket flour in the US and Canada for pet food additives for many years. This flour is now being used in various protein bars and baking, as it is gluten free and has very high protein content.

The US Food and Drug Association has long allowed certain percentages of bug parts in processed foods. In chocolate, they allow 60 bug parts per a 3.5 oz candy bar, while in 3.5 oz of peanut butter, 30 bug parts are allowed. USDA says eliminating bug parts is impossible and bug parts within the prescribed limits pose no health risks.

The United Nations Food Availability Organization has been working since 2003 to promote edible insects. They see entomophagy as a viable and sustainable solution for food shortages as the world population continues to grow. They are funding research into the benefits and challenges of insect eating. They feel that education is a big part of the problem.

There are a few precautions to eating insects. Do not collect from places that use pesticides or herbicides, as these may be harmful to eat. It is best to purchase the insect from a reliable source. Also, people who are allergic to shellfish should take care eating insects, as they are in the same phylum (arthropods) as the insects. Always wash insects before cooking and always cook before eating. Insects can be roasted, grilled, boiled, deep fried or toasted. Some health food shops sell edible insects, however, using the internet increases the variety available.

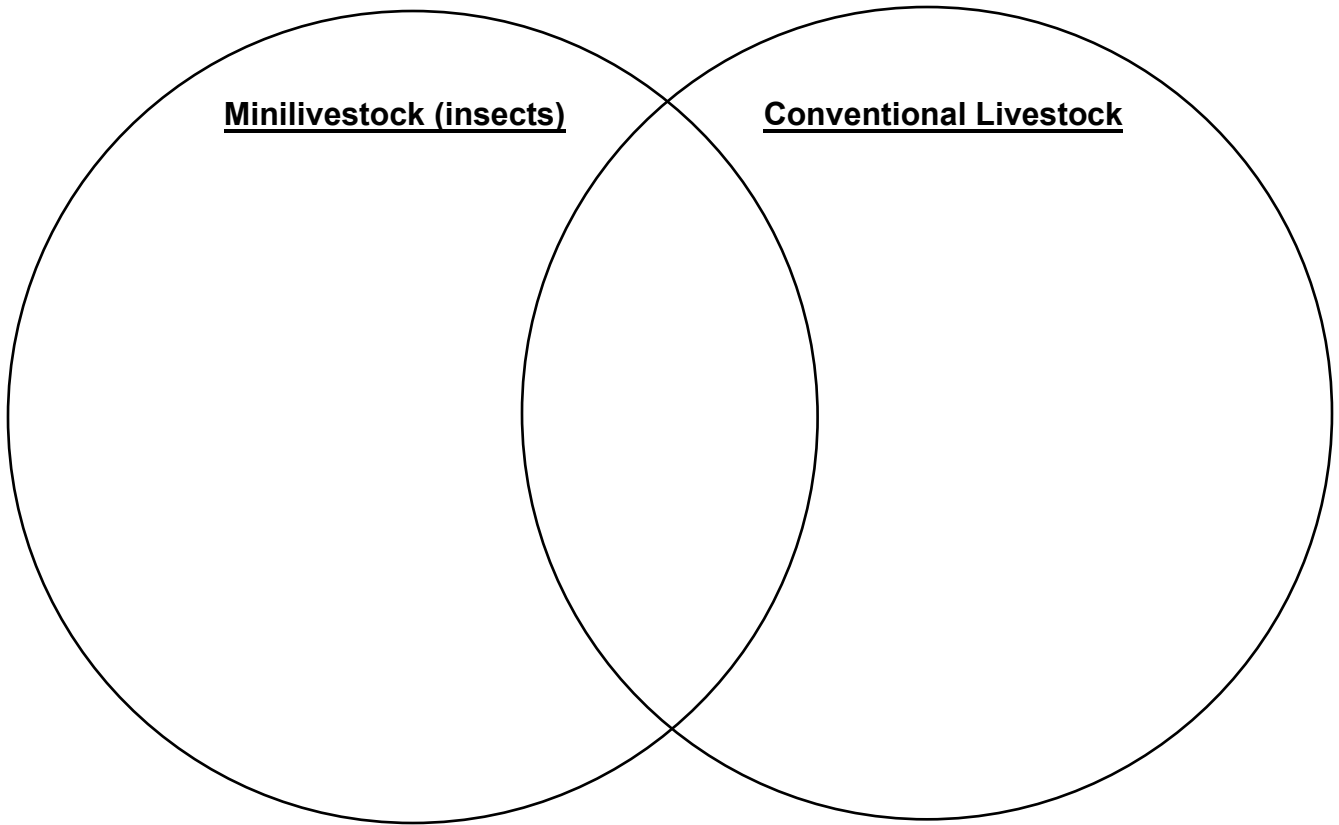
If the eating of insects becomes a norm, they must be farmed, not just collected in their natural settings. This will make the insects available at all seasons and will not destroy the natural balance in the environment.

Entomophagy has been practiced for a long time and seems to be a part of the world's future.

Name \_\_\_\_\_

## Entomophagy Worksheet

Compare and contrast farming of minilivestock (insects) and conventional livestock.



## Entomophagy Worksheet ANSWER KEY

Compare and contrast farming of minilivestock (insects) and conventional livestock.

**Answers will vary. Some possible answers are shown.**

