

Entomophagy

An Antroduction

Jim Dingman MS, REHS, RS, DLAAS, CPO, CEO
Environmental Health & Sustainability Department
City of Plano, Texas

What Is It?

From the Greek:

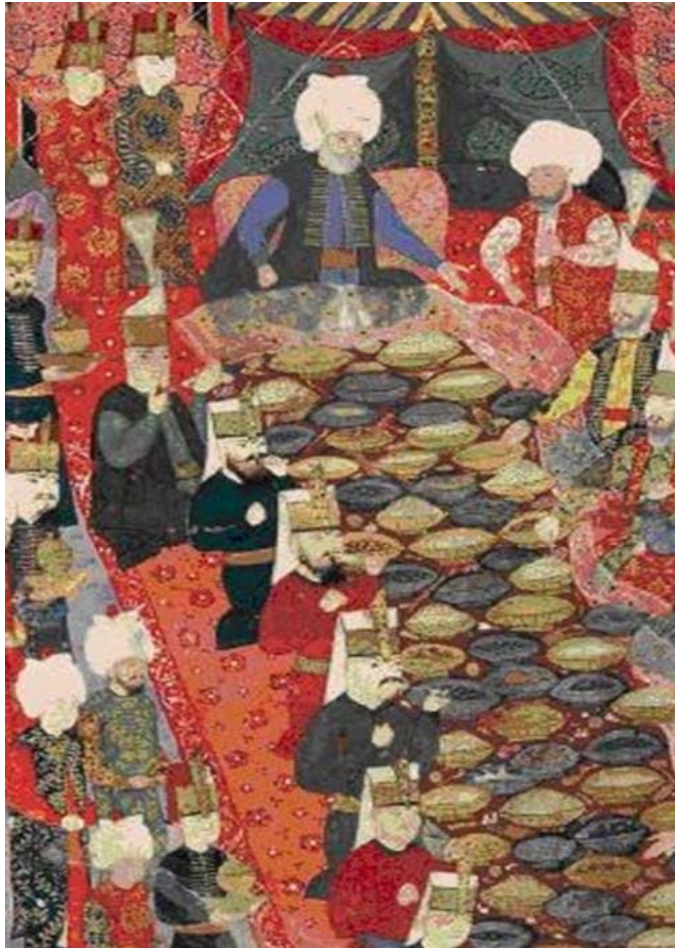
“entomon” “insect”

“phagein” “to eat”

Human consumption of insects
and arachnids as food



Brief History of Entomophagy



8th Century BC



Locust on a stick!

Brief History of Entomophagy

1st reference to Entomophagy - Greece (384BC)



Also literature in China cites the practice of entomophagy (1368).

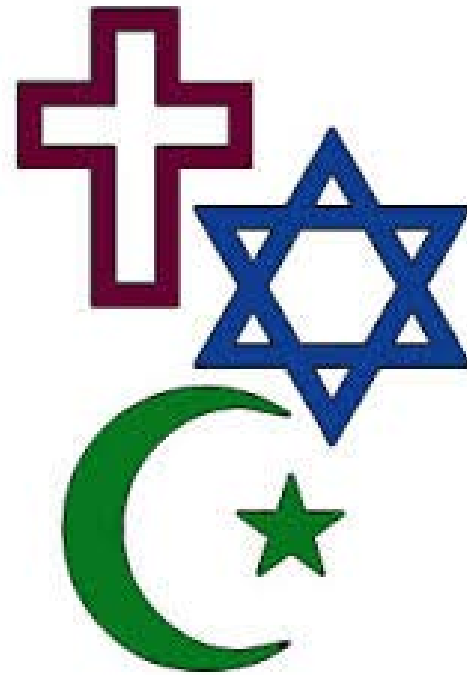
Brief History of Entomophagy

Entomophagy and Religion

Christian

Jewish

Islamic



Christian Religion

Book of Leviticus:

- Desert Locust (*Schistocerca gregaria*)
- Beetles
- Grasshoppers



Jewish Religion

There are 8 species of flying insects permitted to be eaten in the Torah:



2



2



4

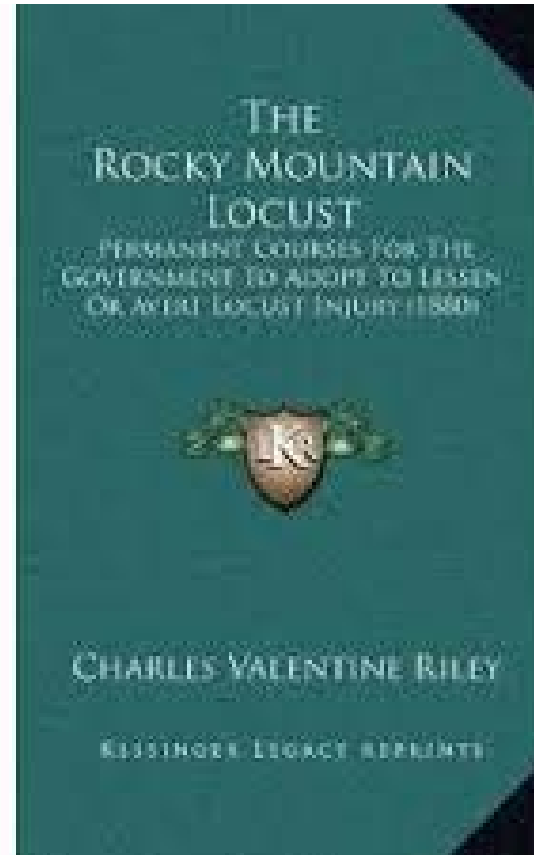
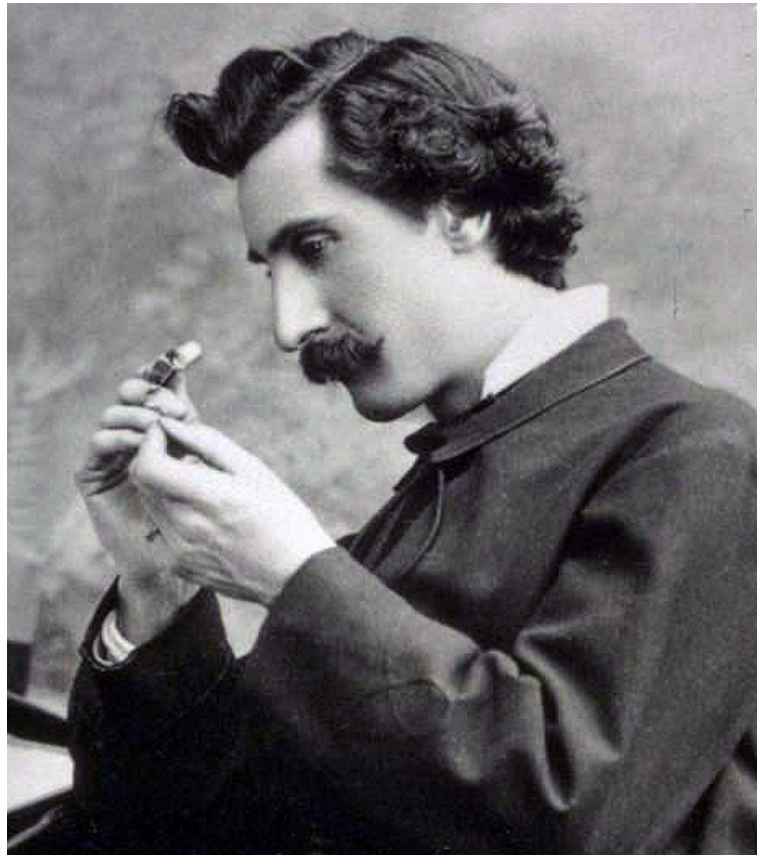
Westernization has caused Jews who previously ate locusts to reverse their habits.

Islamic Religion

- ▶ Several references in Islamic tradition to insect eating - including locusts, bees, ants, lice and termites. Main reference = locust.
- ▶ Locusts are Allah's troops, you may eat them.
- ▶ Locusts are game of the sea; you may eat them.



Brief History of Entomophagy



Charles Valentine Riley 1843-1895
(often referred to as "C.V. Riley").

Brief History of Entomophagy

Locust swarm:

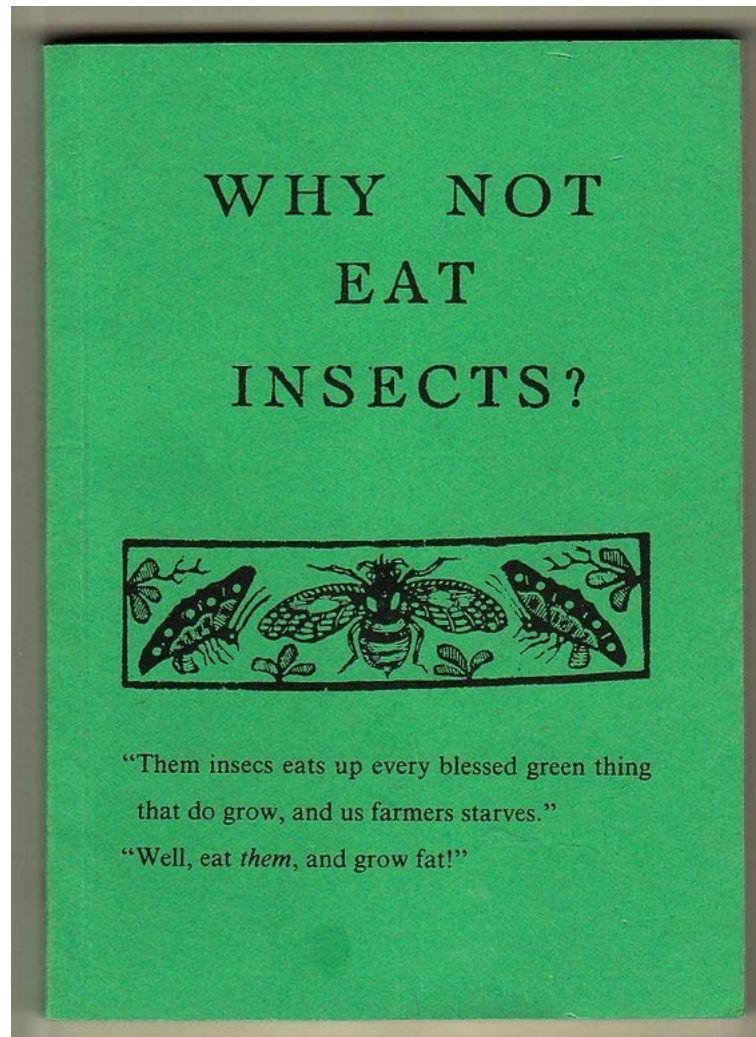
198,000 square miles

27.5 million tons (27,500,000)

12.5 trillion insects

(12,500,000,000,000,000,000)

Brief History of Entomophagy



“Them insects eat up every blessed green thing that do grow, and us farmers starve.”

“Well, eat *them*, and grow fat!” Vincent M. Holt

Brief History of Entomophagy

A scenic view of a mountain valley with vibrant autumn foliage in shades of yellow, orange, and red, with a stone path leading through the trees.

Brief History of Entomophagy

Coprolites (Fossilized poop)



Remnants of ants, beetle larvae,
ticks, and mites present

Brief History of Entomophagy

▶ Most cultures feed on insects ...

▶ USA

▶ Canada

▶ Europe

Cultural Taboo



Is This A Common Practice?



➤ **3, 000 ethnic groups eat insects.**

➤ **Over 2 billion people**



What's On The Menu?



>2,000 species



Most Common



Rule Of Thumb



Current Status of Entomophagy

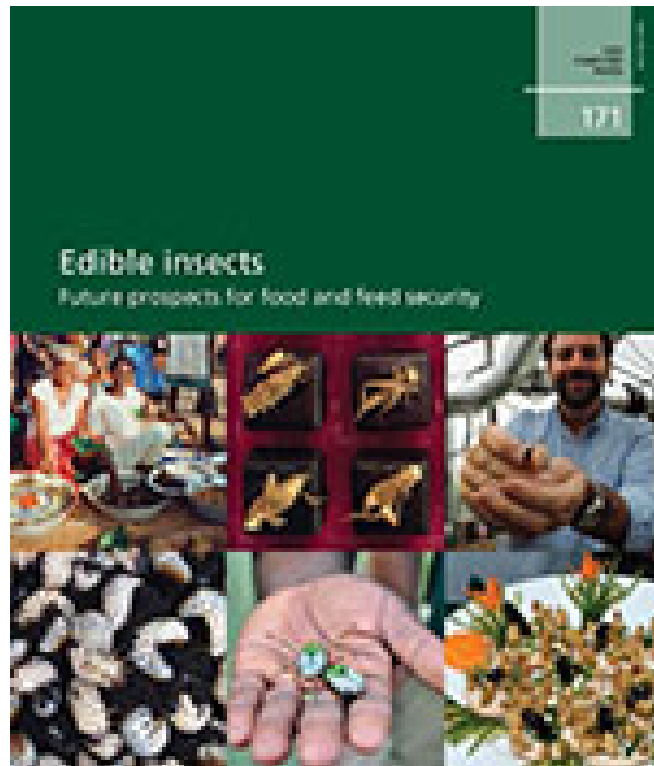
Are edible bugs the new sushi?

Some “bugs” are arthropods and thus *very closely related* to shrimp, crab, crawfish, and lobster, all of which are essentially bugs of the ocean and rivers.



Current Status of Entomophagy

Should we eat more insects?



The U.N. thinks so.

**“Edible insects
Future prospects for food
and feed security”**

FOOD AND AGRICULTURE ORGANIZATION OF THE
UNITED NATIONS Rome, 2013

Current Status of Entomophagy

88 FSEs in the US have bugs on the menu!

(1/3 in CA)

2 in Texas

1 in Illinois

27 mail order suppliers



Current Status of Entomophagy

First USDA
funded project
(100K) to focus
on insect
farming for
human food ...
Athens, GA. July
2015



The Big Question ...



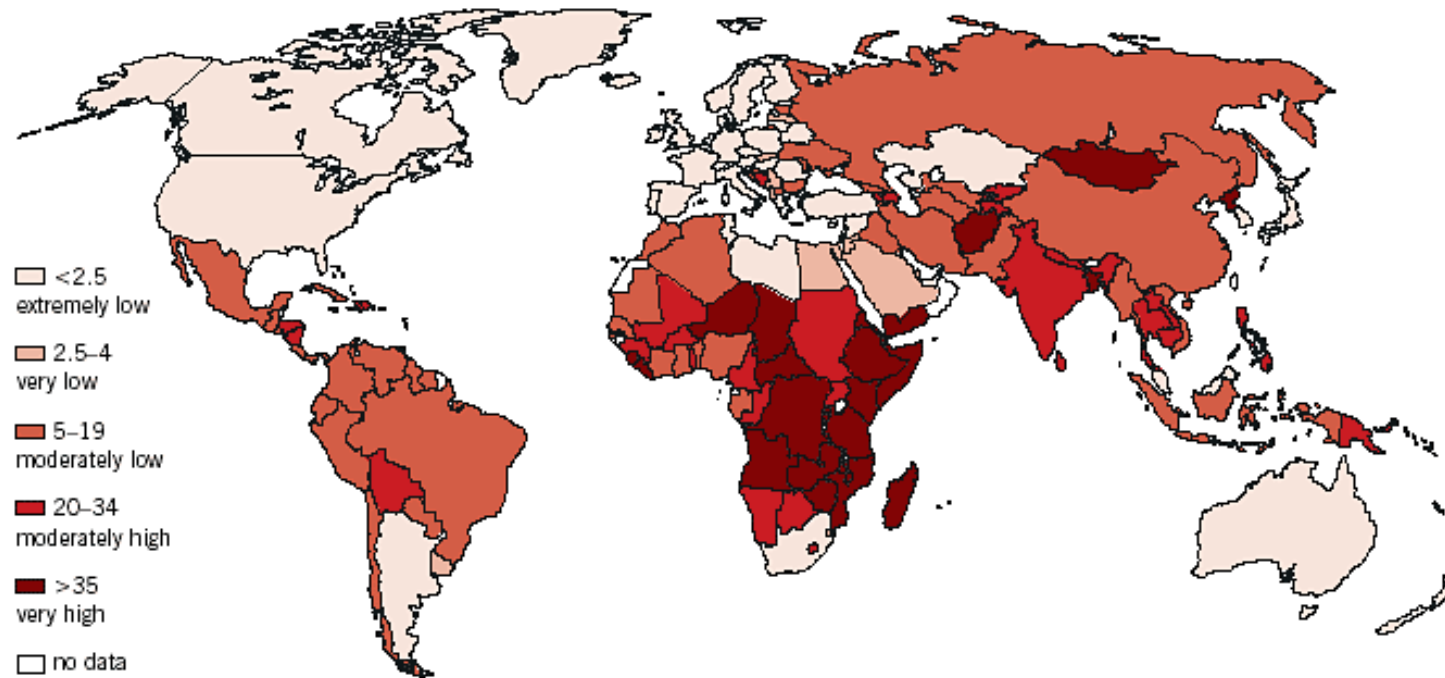
Answer In A Nutshell ...

“We” cannot adequately feed the growing world population.

Why?

Reason ... Food Scarcity

**925
MILLION**
PEOPLE ARE UNDERFED
GLOBALLY



Food is the new oil and land is the new gold

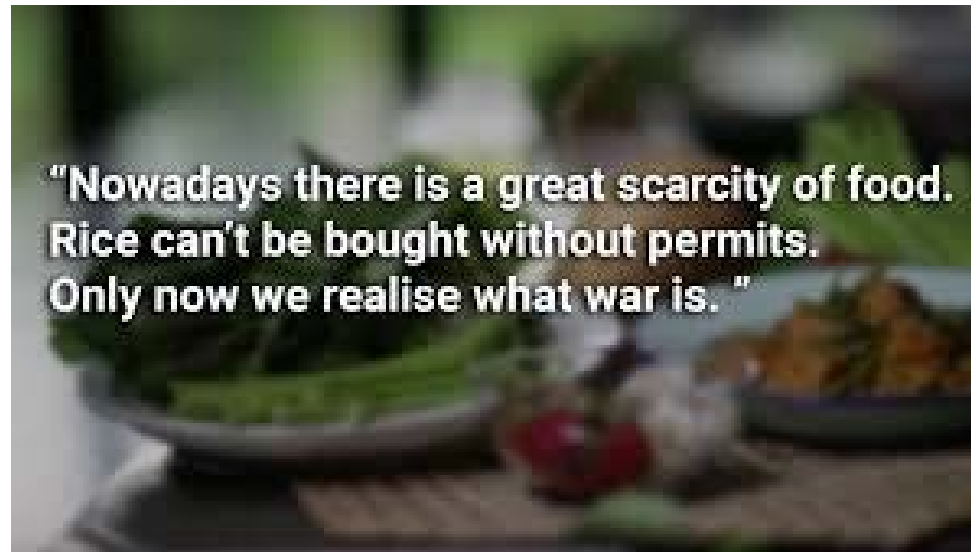
Reason ... Food Scarcity

- ▶ In the last 10 years prices have doubled as demand for food has increased.
- ▶ The price of key food staples, including wheat and rice, to double again in the next 20 years, threatening disastrous consequences for the poor.



Reason ... Food Scarcity

An unprecedented period of world food security has come to an end. The world has lost its safety cushions and is living from year to year. This is the new politics of food scarcity. We are moving into a new food era, one in which it is every country for itself.



Reason ... Land

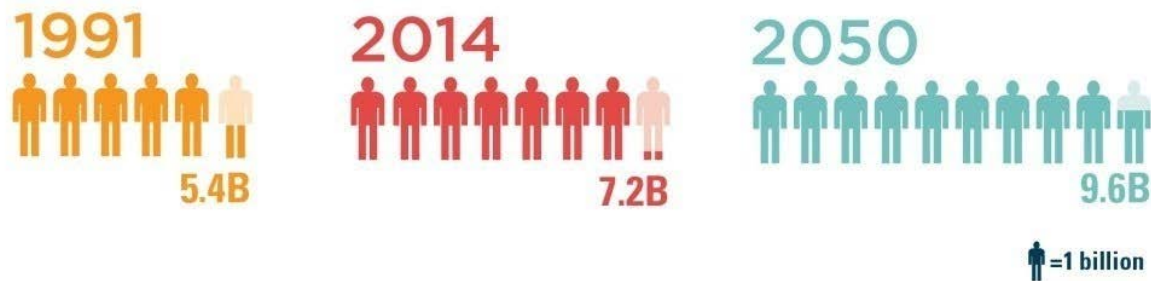


Crop-growing land



Pastureland

Global food production must **INCREASE 100% BY 2050** to meet our growing needs



UN FAO

Reason ... Land

FOOD OR FUEL?

Nearly a billion people will go hungry tonight, yet this year the U.S. will turn nearly 5 billion bushels of corn into ethanol. That's enough food to feed 412 million people for an entire year.

8 BUSHELS
OF CORN

=

21.6 GALLONS
OF ETHANOL
FUEL

OR

ENOUGH FOOD TO
FEED A PERSON FOR
A WHOLE YEAR



Reason ... Cultural Issues

The acceptance or rejection of entomophagy is a question of culture

- ▶ Western countries:
 - ▶ View with disgust ... basis on moral judgement
 - ▶ Associated with “primitive” behavior



Reason ... Cultural Issues

In Western societies - insects are synonymous with nuisance:



Reason ... Nutrition

Bos taurus



1150 lbs.

VS

Gryllus pennsylvanicus



0.000882 lbs.

Reason ... Nutrition



Cricket

- vs -



Cow

PRODUCTION

80%

of a cricket is edible

&

40%

of a cow is edible

&

69%

is protein

28%

is protein

RESOURCES



crickets need

6x

less feed



crickets need

.045%

as much water



crickets produce

80%

less methane



Crickets
Serving size: 100g

Amount Per Serving

Calories 122

Total Fat 5.5g

Phosphorus 185mg

Iron 10mg

Calcium 76mg

Carbohydrate 5.1g

Protein 12.9g



Health Conscious ??



Crunchy Cricket Salad

Producers



LEPSIS
THE ART OF
GROWING
GRASSHOPPERS

Products



Cricket Pasta



Buffalo Worms, Crickets, Grasshoppers

Cricket Flour

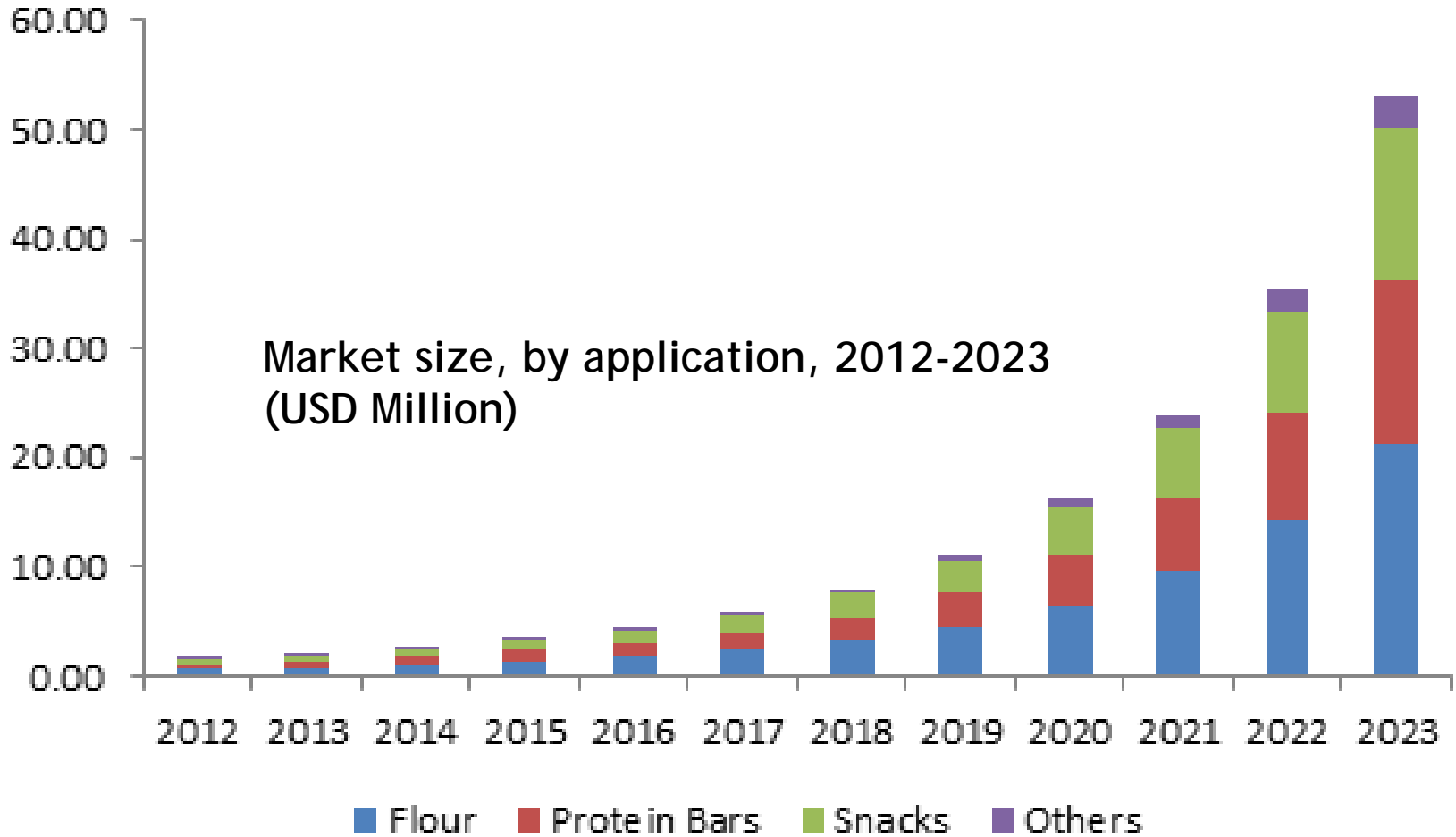


Cricket Chips



Buffalo Worms

Edible Insects Market



Are They Safe To Eat?



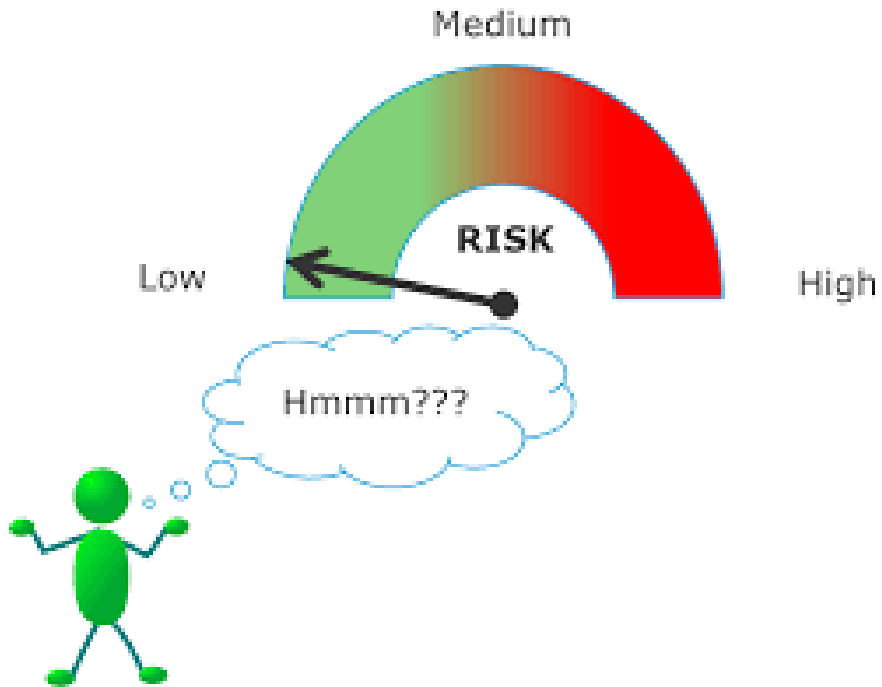
Are They Safe To Eat?

What about zoonotic diseases?

- Insects are potential disease vectors
- Choking Hazard
- Side effects: allergens, anti-nutrients, toxic chemicals, chitin-related issues

Are They Safe To Eat

- Risk is expected to be low
- Could rise with careless use/handling of waste products



How Do You Know?

There are no comprehensive state regulations on the processing and sale of insects for human consumption. There is not a current FDA Guidance Document that addresses concerns specific to insect cuisine.

So, what kind of challenges face regulators in developing guidance?

Challenges in Regulating Entomophagy Facilities

1. Approved source
2. Understanding the process
3. Understanding the hazards
4. Training staff
5. No specific regulations
6. Establishing jurisdiction



Regulation

Codex Alimentarius Standard 152-1985:

- ❖ Stipulates that **wheat flour** shall be free of:
 - ❖ Abnormal flavors, odors, and living insects
 - ❖ Filth (including dead animals) in amounts that may be a health hazard to humans

Insects **in** food vs. insects **as** food

Regulation

- ❖ 20 states involved in entomophagy “regulation”
- ❖ Main insect is cricket
- ❖ Using GMP, modified GMP or GRAS as a guideline
- ❖ GMPs are not a food process - or product - specific regulation



Regulation

- ❖ May fall under the “Preventive Controls for Human Food” (PCHF) rules under FSMA.
 - ❖ Relies on industry for information on and identification of hazards
 - ❖ Validate / verify controls of hazards based on scientific data



Regulation

FDA is developing guidance documents addressing:

- Hazard analysis and preventive controls
- Validation of process controls
- Environmental monitoring
- Food allergen control



Cricket breeding area

Until then.....

Continue using GMP/Modified GMP, GRAS ...

Or ...



bon appétit

Eat well. Savor life. Pass it on.

Chocolate
Chirp
Cookies
Anyone?



Contact Information

Jim Dingman
City of Plano
Environmental Health
1520 K Avenue, Suite 210
Plano, TX. 75074
972-941-7143
jimdi@plano.gov

