

# **Integrated Pest Management**

## **Keeping the bugs**

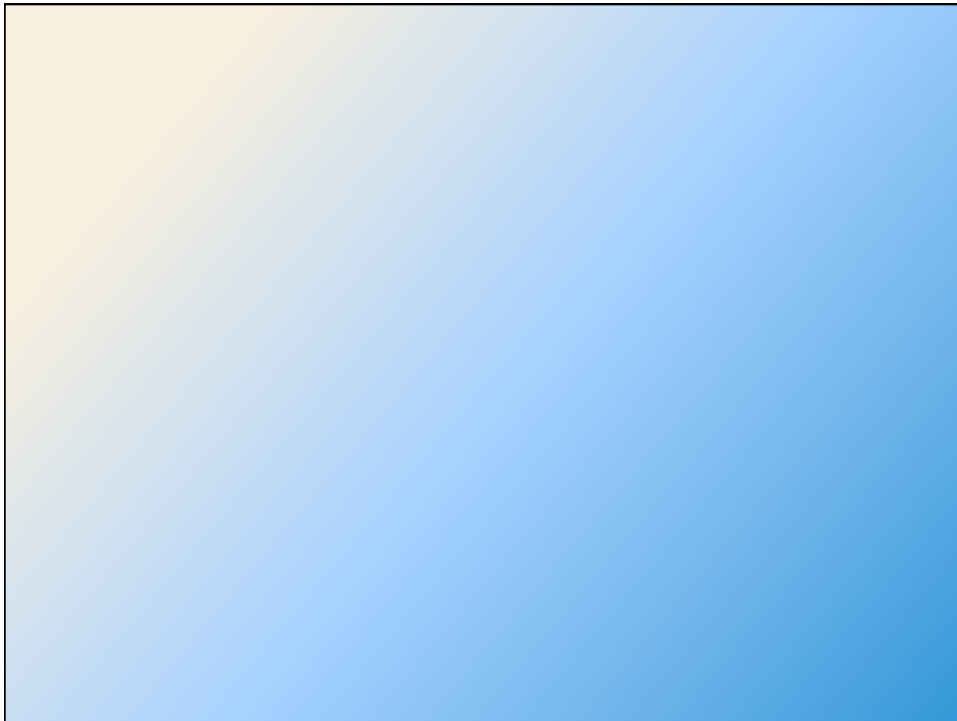
(and birds and rats and mice and raccoons, and....)

# **out**

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## Salmonella

An estimated 1.2 million cases occur annually in the US; of these, approximately 42,000 are laboratory-confirmed cases reported to CDC.

Estimated 400 fatal cases each year; a few cases are complicated by chronic arthritis.

Source: [www.cdc.gov/salmonella/general/technical.html](http://www.cdc.gov/salmonella/general/technical.html)



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"Thank you, in advance, for using the information we learn today to keep \_\_\_\_\_ safe and healthy."



There is only one boss.  
The customer.  
And he can fire everybody  
in the company from the  
chairman on down, simply  
by spending his money  
somewhere else.

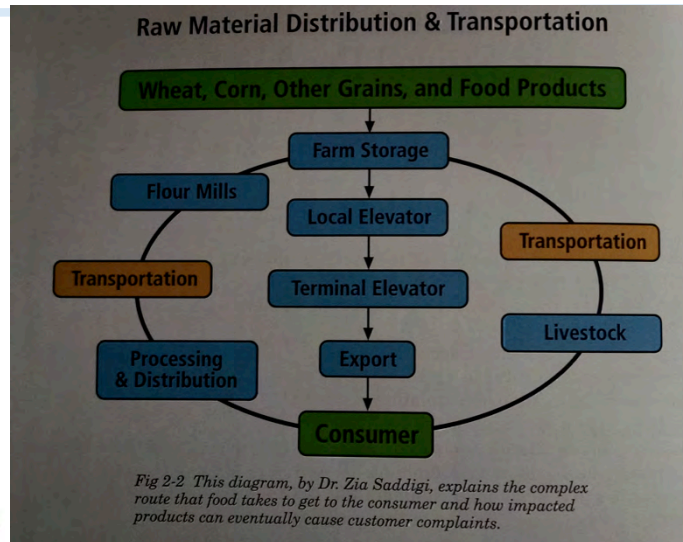
Sam Walton

This is not an option





## Farm to table



Source: "Reducing Customer Complaints in Stored Products" by D. Mueller

## You are a mouse







## What all animals need

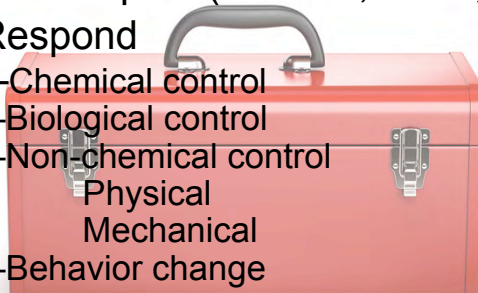
- Food
- Water
- A place to hide
  
- Sometimes: a way in or out of a space



## The Pest Management Process

1. Inspect and monitor
2. Identify
3. Make a plan (location, scale, expectations)
4. Respond
  - Chemical control
  - Biological control
  - Non-chemical control
    - Physical
    - Mechanical
  - Behavior change
5. Evaluate effectiveness

Integrated



## The Pest Management Process

1. Inspect and monitor
2. Identify
3. Make a plan (location, scale, expectations)
4. Respond
  - Chemical control
  - Biological control
  - Non-chemical control
    - Physical
    - Mechanical**
    - Changing people's behavior**
5. Evaluate effectiveness



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## Principles

- "Think like the pest"
- Management is a continuous process
- Pest conducive conditions make pest vulnerable areas
  - If you build it they will come
  - Animals follow food
- LOCATION, LOCATION, LOCATION



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## How pests get inside

### Hitchhiking (Us)

- Grains infested
- Packaging infested
- Pallets infested
- Trucks infested
- Hitchhiking with employees

### From directly outside (Them)

- Jump
- Fly
- Crawl
- Burrow

## Early detection and rapid response

Inspectable & cleanable  
(construction, design, layout)

AND

Inspected & cleaned  
(PEOPLE)



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Inspectable?  
Cleanable?

Inspected?  
Cleaned?

**Inspectable? Cleanable?  
Inspected? Cleaned?**













## Nothing is hidden from pests

Think of....

A place at your work that is not inspectable or cleanable.

A way to make this spot more inspectable and cleanable.



**Creativity without safety  
is poor common sense**



## How pests get inside

### **Production process (Us)**

Grains infested  
Packaging infested  
Pallets infested  
Trucks infested  
Employee  
introductions

### **From outside (Them)**

Jump  
Fly  
Crawl  
Burrow  
Swim

## Why pests want to get inside

### Production process (Us)

Grains infested  
Packaging infested  
Pallets infested  
Trucks infested  
Employee  
introductions

### From outside (Them)

Jump  
Fly  
Crawl  
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<http://ow.ly/BJnce>

Project led by Chris Geiger,  
San Francisco Department of  
the Environment IPM &  
Green Purchasing Program

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Centers for Disease Control  
and Prevention.



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## Think like a pigeon



## Exclusion: prevent pest entry and eliminate hiding spots

- |                  |                       |
|------------------|-----------------------|
| Screens          | Exterior lighting     |
| Netting          | Strip curtain         |
| Door sweeps      | Bird spikes           |
| Hardware cloth   | Drainage              |
| Caulking         | Wire gauze            |
| Sealant          | Sheet metal           |
| Chimney cap      | Cement mortar         |
| Escutcheon plate | Air curtain           |
| Expandable foam  | Positive air pressure |



## Utilities, HVAC, and Chutes



**Principle 16.1** Design and construct utility penetrations, such as water pipes, electrical wires and conduit, cold air return ducts on forced air furnaces, and exhaust vents, to minimize pest intrusions.

### 16.1.1 Rodent-resistant materials to seal around utility penetrations.

Use escutcheons, cement mortar, or copper mesh or hardware cloth embedded in patching plaster to seal any openings around utility penetrations.

**Effective on:** Ants, Cockroaches, Flies, Mosquitoes, Wasps, Bees, Formosan Termites, Drywood Termites, Subterranean Termites, Misc. Wood Destroying Insects, Spiders, Misc. Insects, Mice, Rats, and Misc. Vertebrates

**Compatibility Issues with Other Design Goals:** None identified

**References:** Hygnstrom et al., 1994, Witmer, 2008, and Corrigan, 2008b



Source: San Francisco Dept. of the Environment

## Planning exclusion

Pests	Building areas	Exclusion tools
Mouse	Roof	Chimney cover
Indianmeal moth	South wall	Door sweep
Warehouse beetle	Loading dock	Screen
Sparrow	Break room	Air curtain



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### 18.1.2 Rodent resistant building materials.

Rodent teeth are well adapted to gnawing through all but the hardest materials. Rats have been known to gnaw through lead. Rodent-resistant materials include concrete with a minimum thickness of 2 inches (5.1 cm) if reinforced, or 3.75 inches (9.5 cm) if not reinforced; galvanized sheet metal if 24 gauge or heavier for wall or pipe barriers, 22-gauge or heavier for kick plates or door edging, or 14-gauge if perforated or expanded sheet metal grills; brick if 3.75 inches (9.5 cm) thick with joints filled with mortar; hardware cloth (wire mesh) if woven, 19-gauge, 1/2- x 1/2-inch (1.3- x 1.3-cm) mesh to exclude rats or 24-gauge, 1/4- x 1/4-inch (0.6- x 0.6-cm) mesh to exclude mice; aluminum if 22-gauge for frames and flashing or 18-gauge for kick plates and guards; plaster; or corrugated metal.

Effective on: Mice, Rats, Opossums, Raccoons, and Misc. Vertebrates

Compatibility Issues with Other Design Goals: None identified

References: Hygnstrom et al., 1994



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## Caulking and sealant

Works for small gaps and holes (3/8" or less)

Must be an investment, not a quick fix

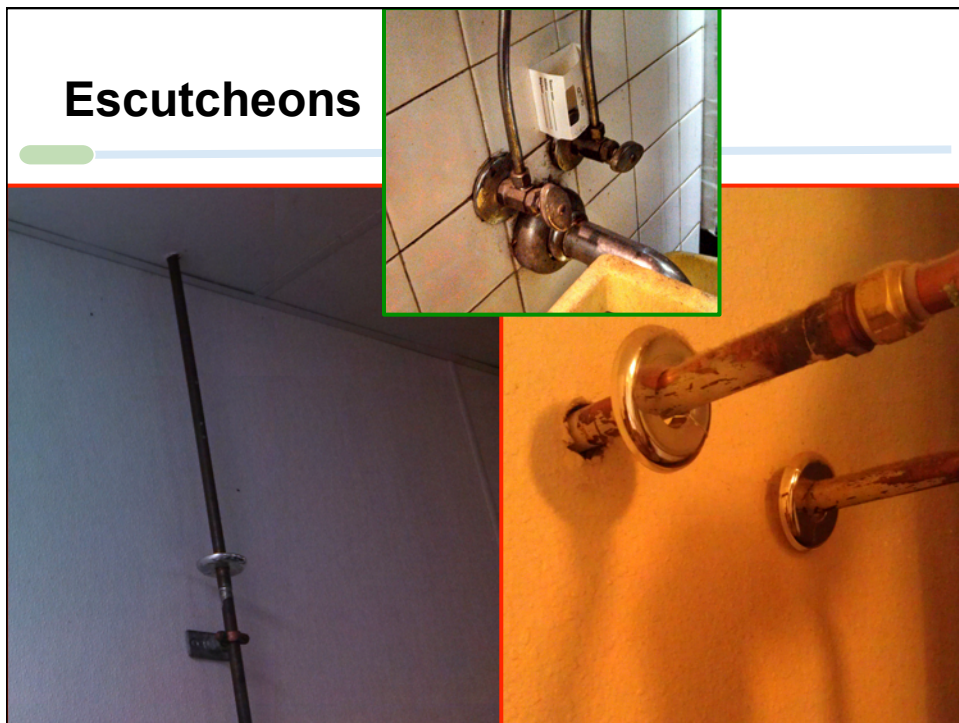
Location, location, location!



## Expandable foam



## Escutcheons





## Screen, wire gauze, sheet metal & hardware cloth

What pest is trying to get in? → Pick a material with an appropriate size hole

Will it rust? → Choose copper, stainless steel, aluminum, galvanized metal

## Drains







## **A lack of pests is your reward**

Pest prevention is the gold-standard

Early detection and rapid response is the minimum requirement

## In summary

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Keep the area good for people (business) and bad for pests.

Get yourself some kneepads and a bright flashlight.



**Thank You & Good Luck!**

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