Project Planning for: Post Harvest Efficiency, Profitability & Food Safety

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go.uvm.edu/ageng
capsvt.org

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NOFA Conference– Burlington, VT

Outline

Introduction: Who we are and what is your post harvest challenge

Flow: Planning for flow of product, people, and water

Infrastructure: Buildings, utilities, design, materials, and construction

Equipment: Wash lines, spinners, cleaning and sanitizing, and coolers

Tools: Containers, hoses, cleaning tools, thermostats, and records

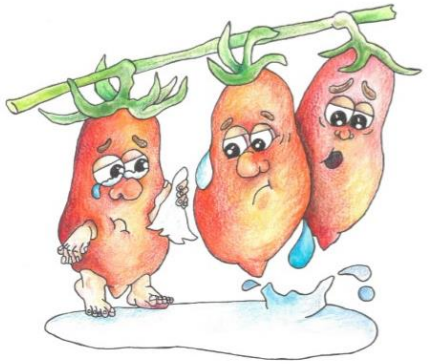
Whiteboard Activity: Planning your project

FRESH PRODUCE...

IS ALIVE

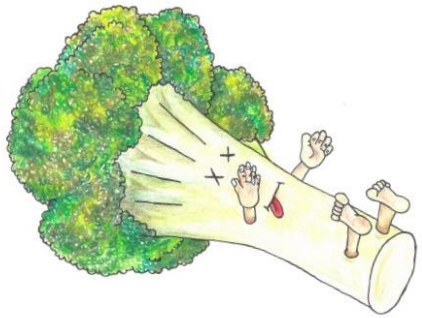
BREATHES

RELEASES HEAT



LOSES MOISTURE

CAN GET SICK



CAN EVEN DIE

Illustration by Virginia Jaquish.

More info: USDA Handbook 66 – go.uvm.edu/respiratorymetabolism

THE UNIVERSITY OF VERMONT EXTENSION

Produce Safety Overview

Risk Reduction

Ain't Rocket

Science,

BUT….

More info - capsvt.org & producesafetyalliance.cornell.edu

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Contamination Sources

Humans

Soil

Produce

Animals

Buildings
Equipment
Tools

Water

Produce Safety ALLIANCE

Flow

The University of Vermont

Principles of Lean

Identify Value – What does your customer want?

Map the Value Stream – How do you provide value to the customer? Where is there waste? How can you remove that waste?

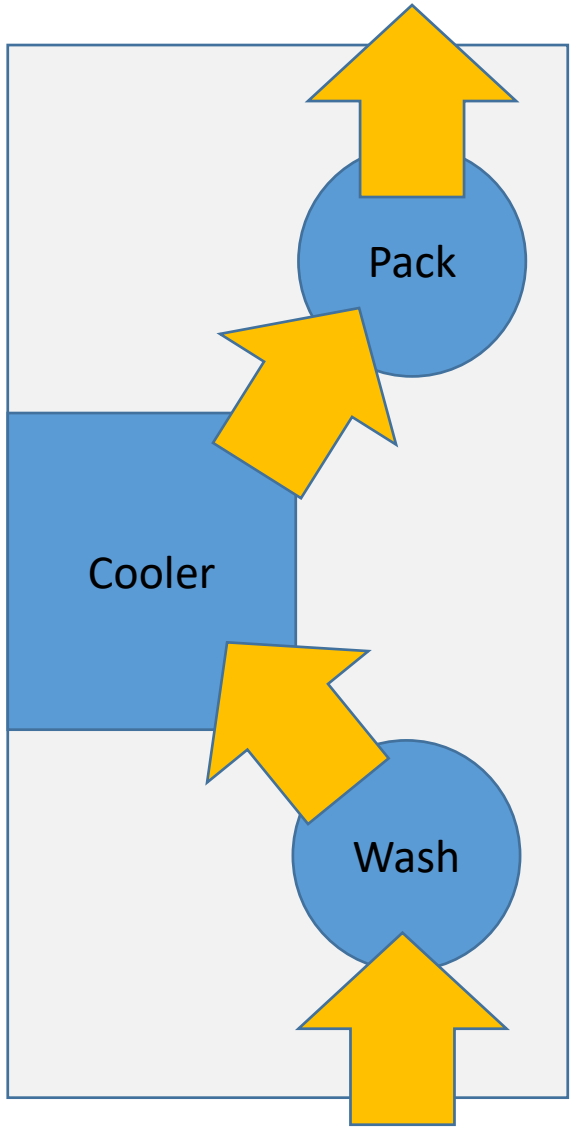
Create Flow – Avoid interruptions, delays and bottlenecks. Plan for movement.

Establish Pull – Customer can depend on "just-in-time" delivery as needed.

Seek Perfection – Always look for opportunities to improve.

Flow of Product

- Smooth, single pass flow of product.
- Minimizes wasted energy.
- In the direction from field to customer.



Straight pass setup.

Best suited to buildings with long, rectangular floor plans.

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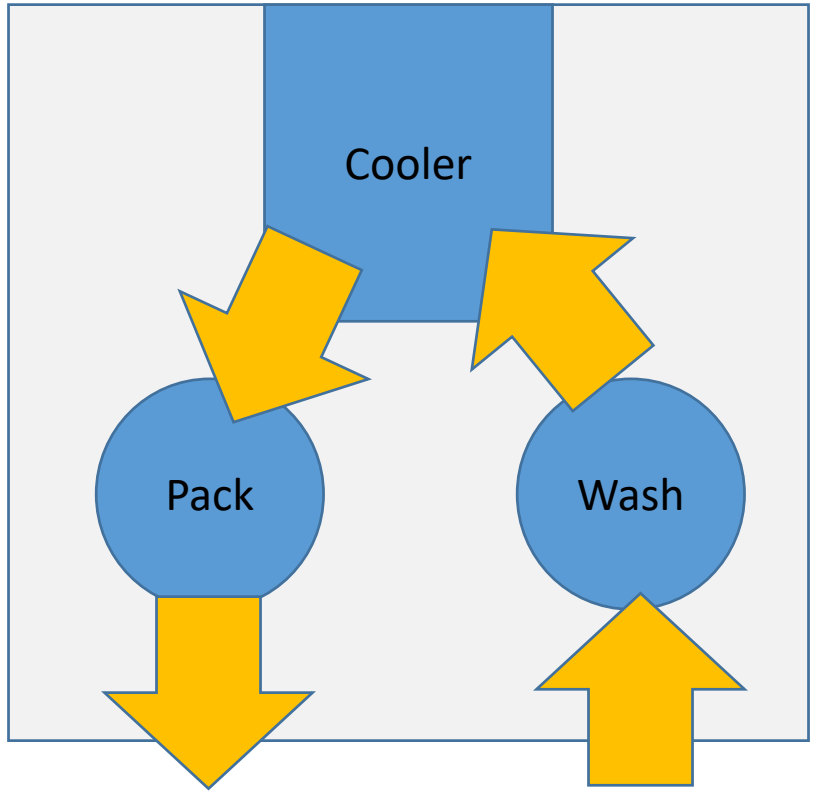

U-turn setup

Best suited to square floor plans.

Can use a single large door.

Flow of People

- Consider specialization of tasks (e.g. harvest crew, wash/pack crew)
- Location of other tasks (e.g. tool storage, hand washing, break room.)

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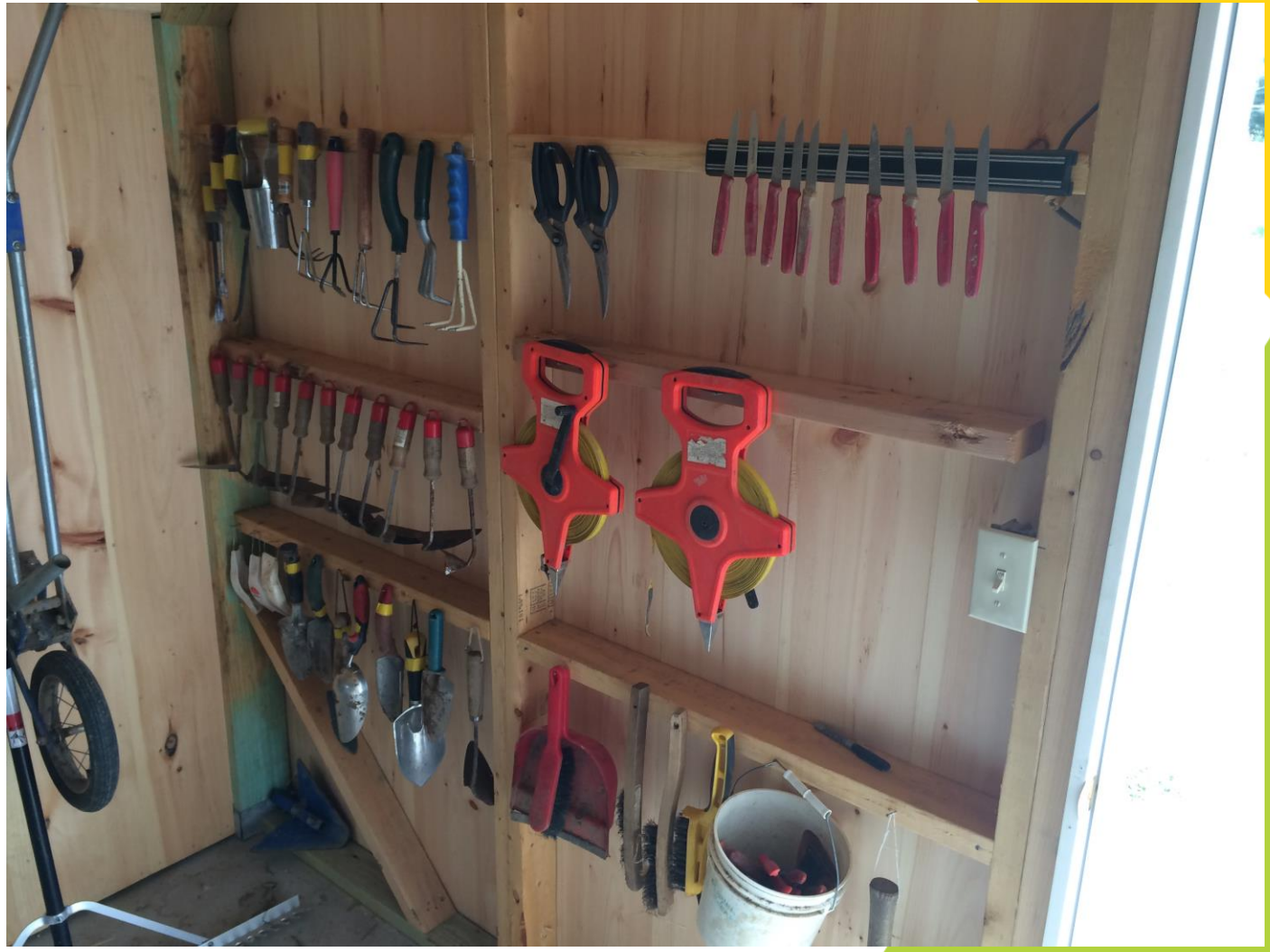

More info – go.uvm.edu/mighty

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Any Scale, any Budget...

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Flow of Water

- Hard plumbed vs. hoses
- Hose hangers / trolleys
- Multiple drops for hoses
- Drains

More info - go.uvm.edu/floors

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Activity 1:
Sketch Flow Through Farm

(People, product, water, vehicles, existing buildings, fields)
Draw: Flow arrows, pinch points, risk areas or red flags

15min

15:00

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Buildings

The University of Vermont

Packshed Essentials

- A wide range of buildings (or spaces) can be effective
- “Four sticks and roof”
- Key features
  - Sound construction
  - Protection from the weather
  - Exclusion of pests
  - Siting

More info - go.uvm.edu/barnplans

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INSULATION

Foam boards

- Blue/Pink (polystyrene)
- White (poly isocyanurate)

Rockwool or Mineral Wool

Spray foam (poly iso)

Generally avoided due to high moisture issues:

- Fiberglass (pink)
- Cellulose

Insulation Options	$/R/ft2
Spray Foam - Closed Cell	0.1667
Spray Foam - Open Cell	0.1083
Blue Board	0.0968
Poly Iso Board (HiR)	0.0732
Fiberglass Roll	0.0024

More info - go.uvm.edu/coolerwalls

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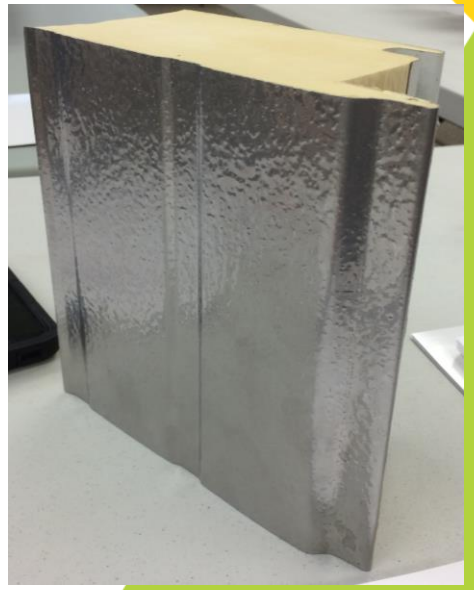
Structural Insulated Panels

- Pre-fabricated insulated panels that can be used for cooler siding
- Can be load-bearing
- Can be used for roof-insulation
- Think about smooth and cleanable finish surface
- Metal Insulated Panels (MIP) – Cooler Panels



More info - go.uvm.edu/coolerwalls

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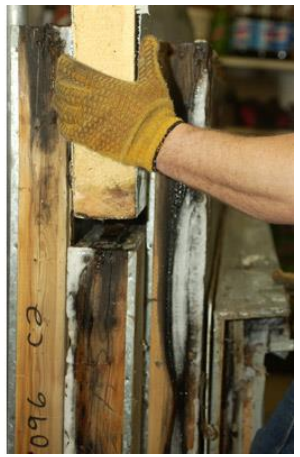
Avoid Bare Wood & Liquid Water



More info - go.uvm.edu/coolerwalls

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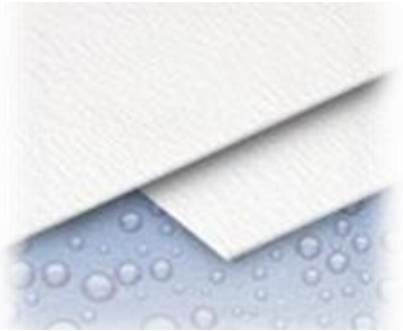
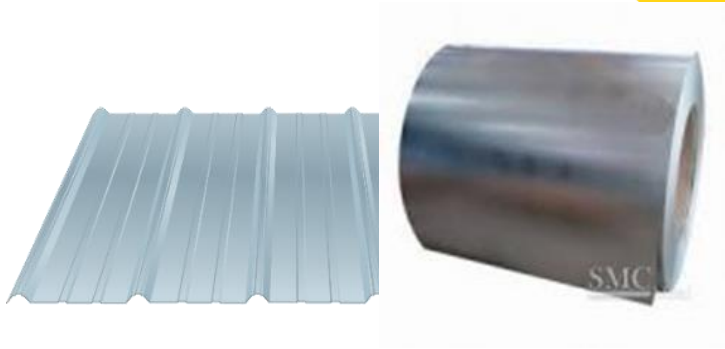
Smooth and Cleanable Materials

Fiber Reinforced Plastic (FRP) aka "Dairyboard" $1.03-1.92 / ft^2



WallTuf
$1.25 / ft^2



Galvanized Aluminum (Galvalum)
$0.76-0.95 / ft^2

TrussCore
$1.52 / ft^2

Extrutech
$2.20 / ft^2

Utilite
$1.85 / ft^2

Ribcore
$0.77 / ft^2

More info - go.uvm.edu/smoothnclean

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Rodent & Pest Control

Remove Food

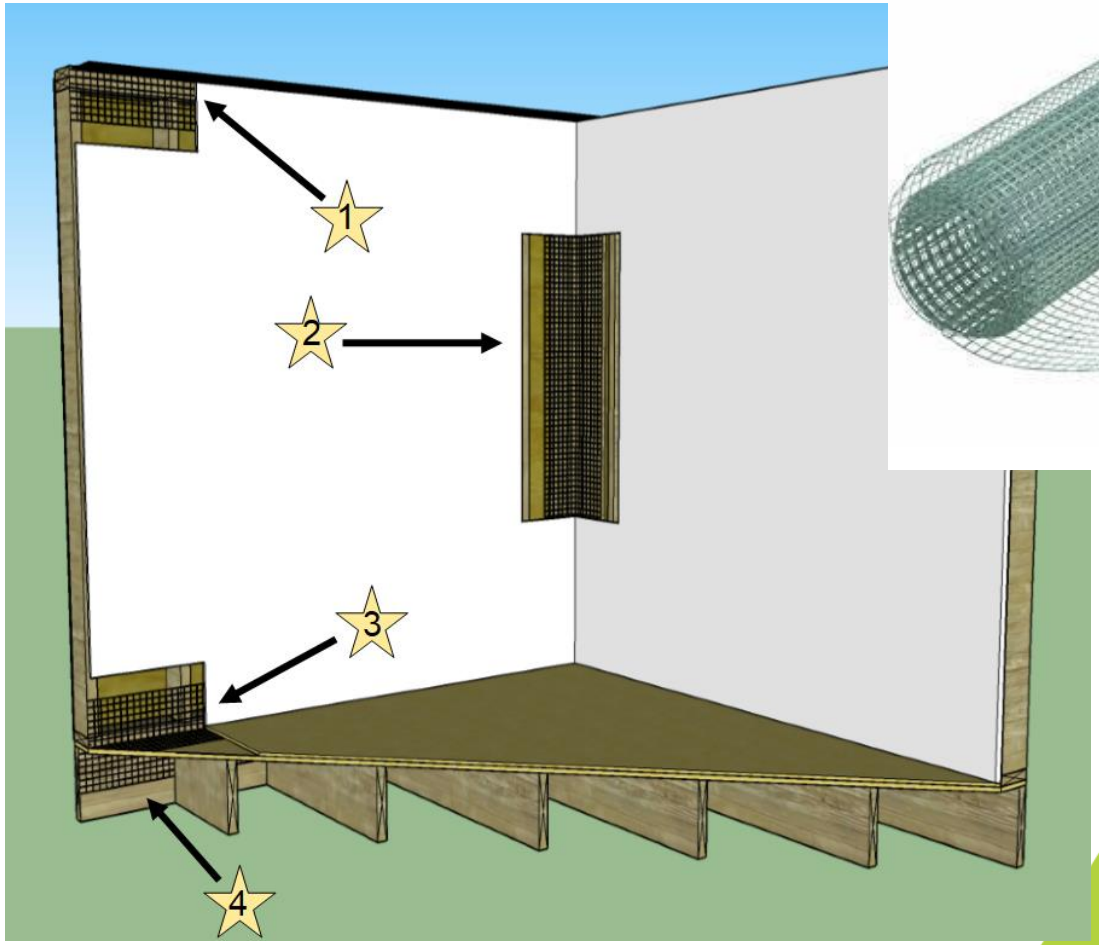
- e.g., cull piles

Limit Access

- Tight construction
- Flashing / wire mesh / hardware cloth at corners
- Closed containers
- Cement curbs

Reduce Population

- Bait, trap, kill



More info - go.uvm.edu/rats

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Evaporator Drains

Lots of moisture collects on the floors in coolers

- Build entire cooler slanted towards the door (or drain)
- Incorporate a drain into the cooler

Route condensation line intentionally.

Also CoolBots™!

Equipment

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Dunk / Dump Tanks

Bubbler!

Double / Triple Bay Sinks

More info – go.uvm.edu/sinks

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More info – go.uvm.edu/sinks

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Drum / Barrel Washers

Brush Washers

How do you clean this?

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Rinse Conveyor

More info - go.uvm.edu/rinseconveyor

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More info - go.uvm.edu/rinseconveyor

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SPINNERS

More info - go.uvm.edu/greensspinners

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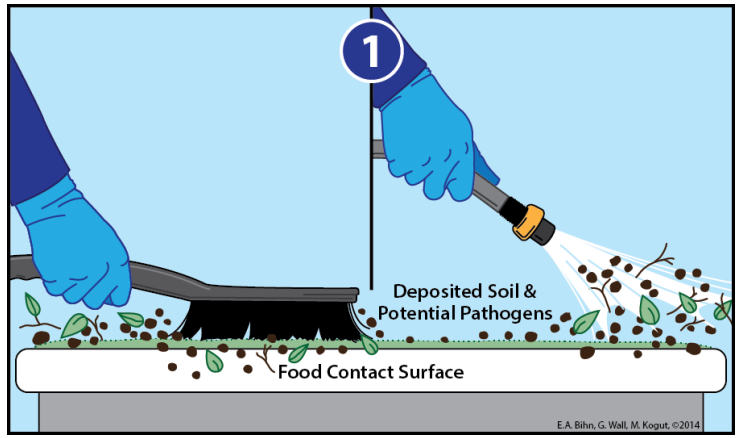
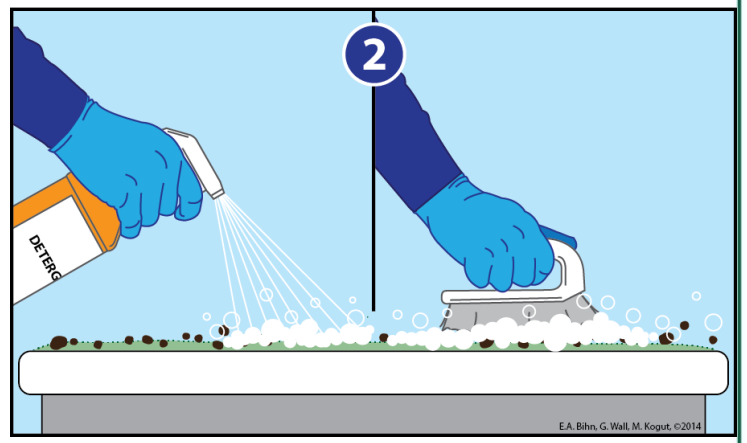
Cleaning & Sanitizing Food Contact Surfaces

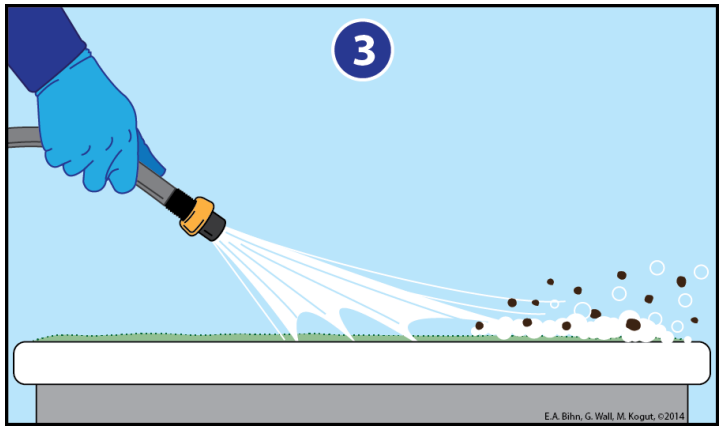
1: Remove any obvious dirt and debris from the food contact surface



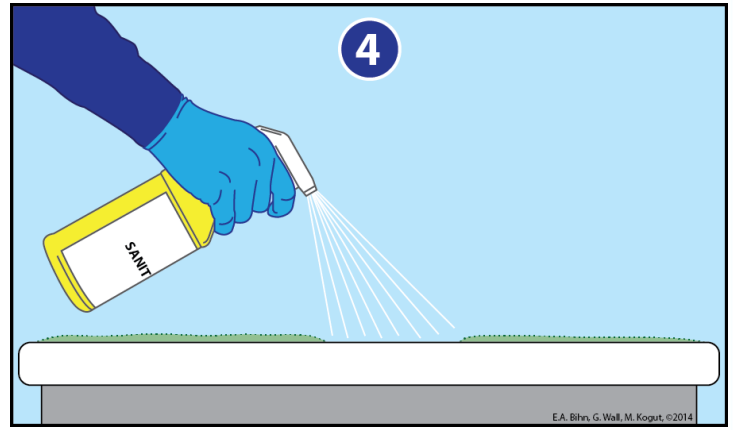
2: Apply an appropriate detergent and scrud the surface



3: Rinse the surface with clean water, making sure to remove all the detergent and soil



4: Apply a sanitizer approved for use on food contact surfaces. Rinsing may be necessary. Let the surface air dry.



Produce Safety ALLIANCE

Coolers

- Volume
- Number of zones
- Sizing of refrigeration or heating
- New planning tool:
  - http://go.uvm.edu/cropplanner

CoolBots™

Pro's

- Low initial cost
- Easy to retrofit into existing spaces with basic construction
- DIY install and maintenance
- BYOB – Build Your Own Box

Con's

- Slow to "pull down" temperature
- Slow to recover from rises in temp (e.g. door openings).
- Can not freeze, only cools down to ~35F

More info - go.uvm.edu/coolbot or www.storeitcold.com

Containers – Totes, Lugs, Cartons, Bins, Boxes

- What crops?
- Drain holes or a solid bottom?
- Vented sides?
- Cleanable?
- Durability
- Can you easily label?
- Light blocking and UV resistance
- Stacking/Nesting?
- Different colors?
- Is the container ergonomic?


Bulbcrates


Red and Yellow Harvest Crates


Buckhorn


MacxAce

More info - go.uvm.edu/totes

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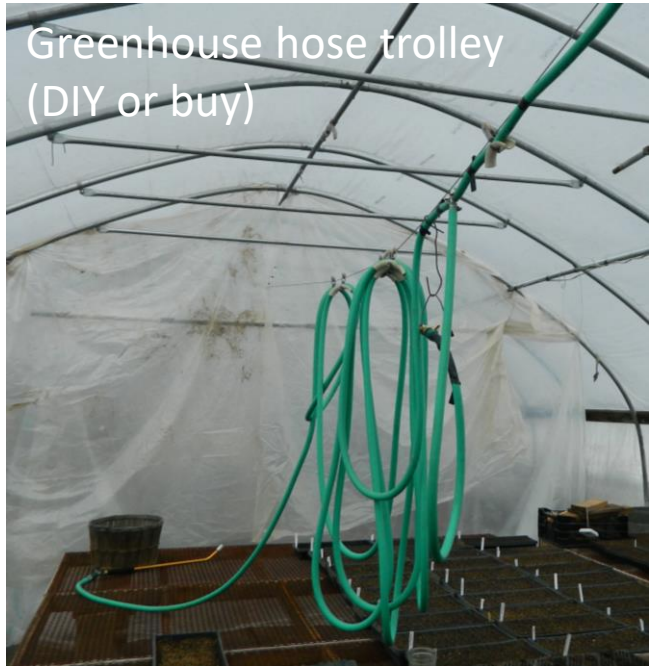
Hoses

- Helpful to have multiple hose drops / spigots
- Aim to keep hoses off the ground
- Many types of nozzles



Hannay Reel

More info - go.uvm.edu/hoses

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THERMOSTATS

- Digital allows for more precise setting and measurement
- Low differential
- Remote probe (can be extended)
- Pay attention to full load amperage limits (may need relay)
- For heating or cooling
- Can be wired with plugs

Johnson Control A419
$60

Ranco ETC11200
$60

DuroStat 102720
$100

Dial Type
$75-90
Not Preferred

More info - go.uvm.edu/thermostats

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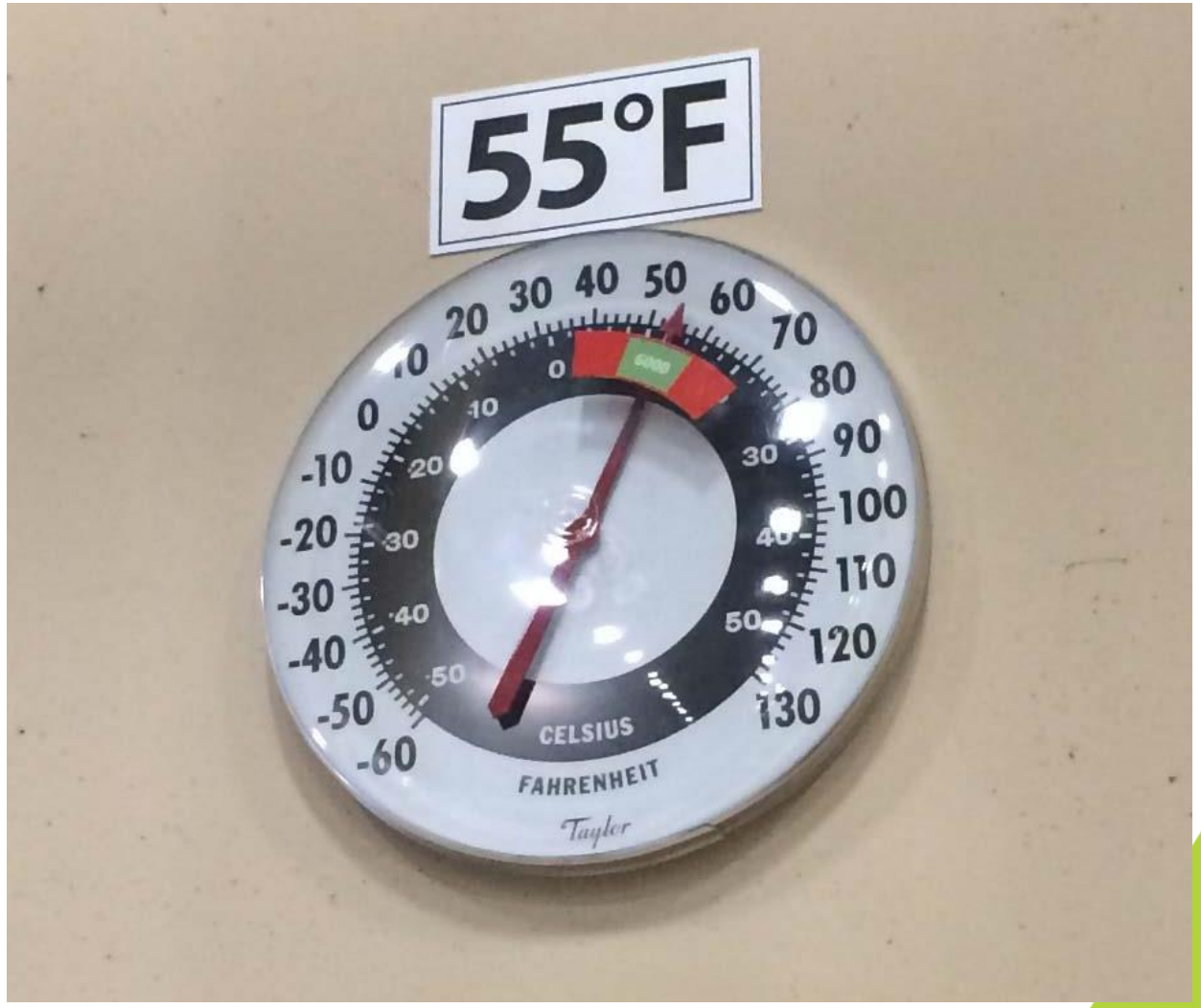
Simple Works, Too.



More info - go.uvm.edu/monitoring

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Post Harvest Case Studies

Footprint Farm – BarnHouse Construction ($300k)

go.uvm.edu/footprint

Mighty Food Farm – New Construction ($100k)

go.uvm.edu/mighty

Last Resort Farm – Dairy Barn Renovation ($60k)

go.uvm.edu/lrf

MORE TO COME!

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Activity 2 & 3
Sketch Packshed & Equipment Layout/flow

(Planning the details of your improvement project)

Q&A with Andy & Hans

2:45-4pm

The University of Vermont

Outline

Activity 2: Details (30min)

Activity 3: Details (30min)

Q&A: as questions come up

Around the Room: Share your plan with the group (15min)

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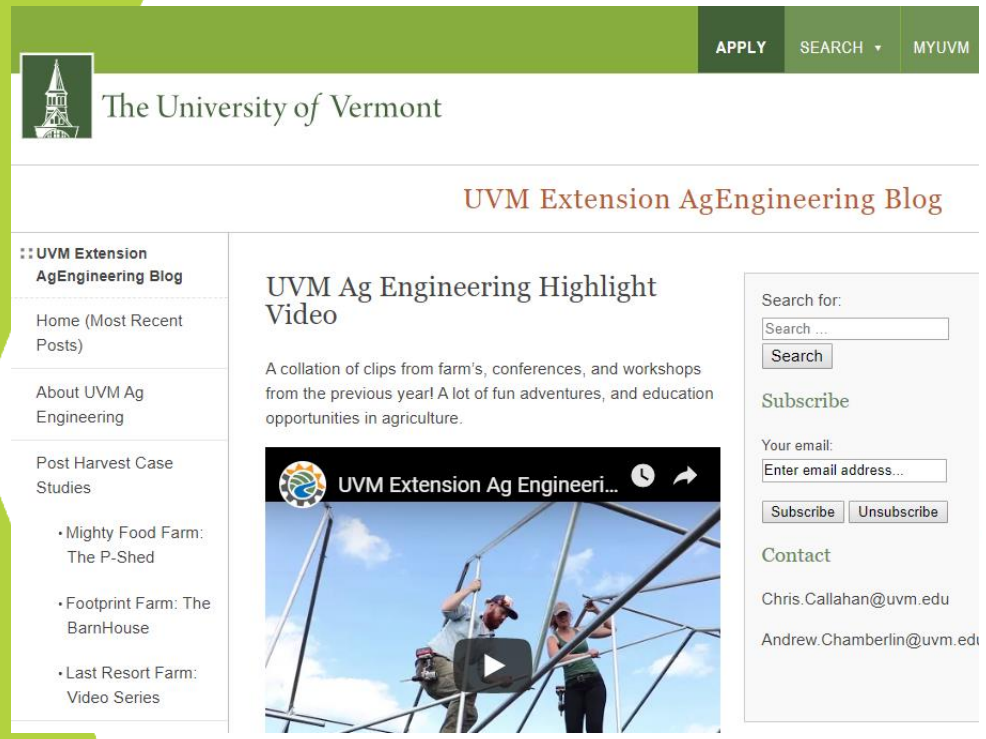

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