

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

UVM

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Cornell University
Cooperative Extension



OUTLINE

Introduction: Who is in the room and what is your post harvest challenge

Postharvest and Produce Safety: Produce is alive and good for us

Flow & Lean Principles: Planning for efficient flow of product, people, & water

Buildings & Infrastructure: Structures, utilities, design, & materials

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

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

Whiteboard Activity: Planning your project

Introductions



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INTRODUCTIONS

Name, Farm, Location

**Postharvest Bottleneck, Challenge
or Point of Pain?**



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Postharvest & Food Safety



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FRESH PRODUCE...



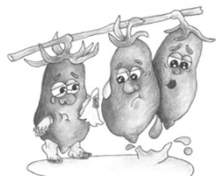
IS ALIVE



BREATHES



RELEASES
HEAT



LOSES MOISTURE



CAN GET SICK



CAN EVEN DIE

Illustration by Virginia Jaquish.

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



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PRODUCE SAFETY OVERVIEW

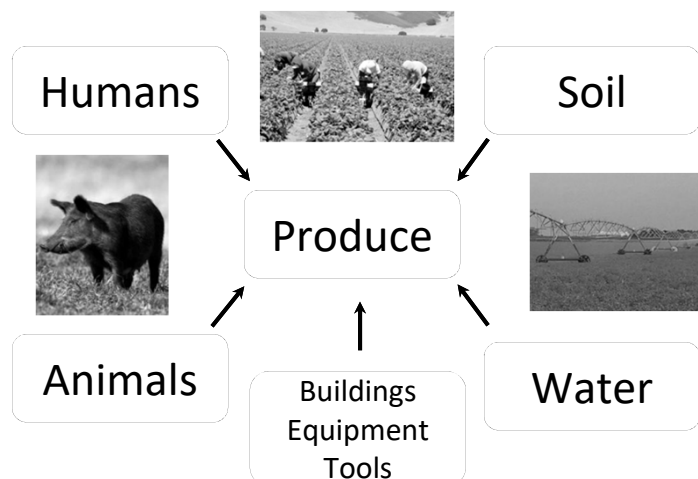
Risk Reduction
Ain't Rocket
Science,
BUT....



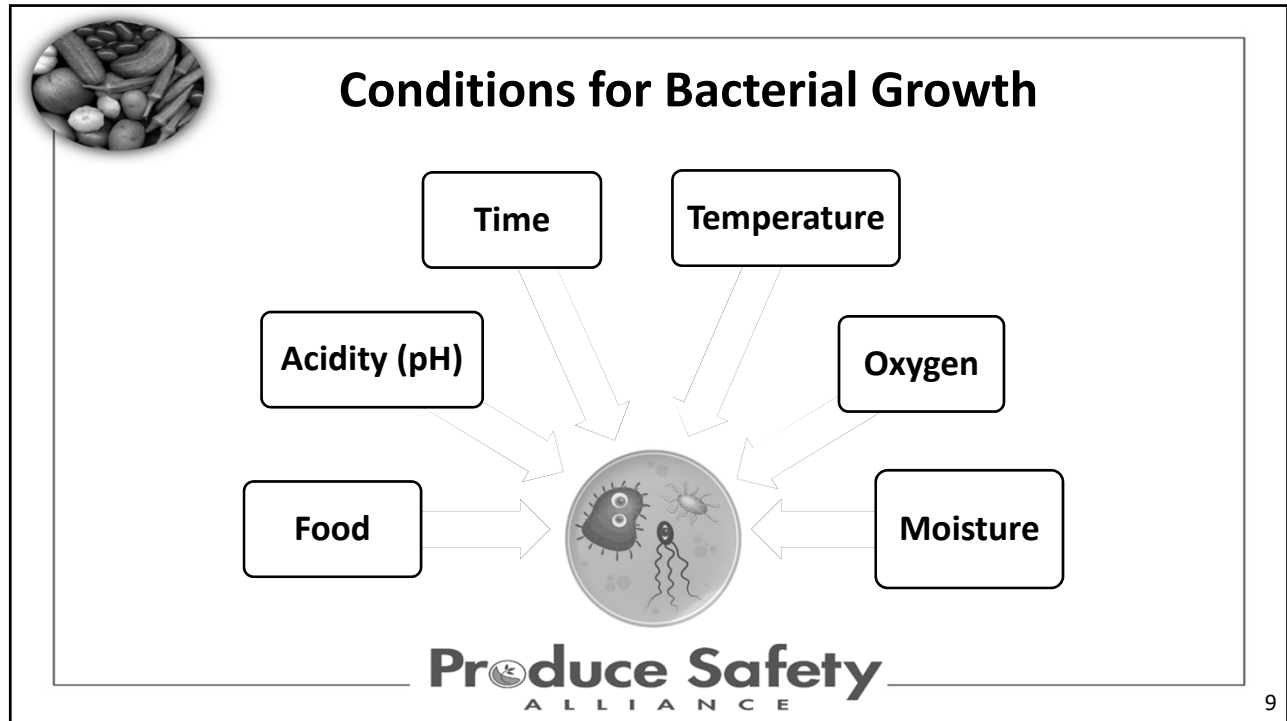
More info - capsvt.org & producesafetyalliance.cornell.edu



Contamination Sources



Produce Safety
ALLIANCE



Flow & Lean Principles



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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.

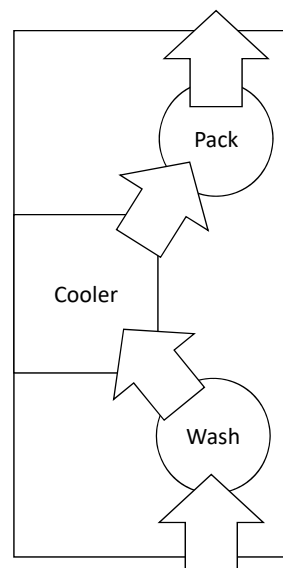
Establish Pull – Customer can depend on “just-in-time” delivery as needed.

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.



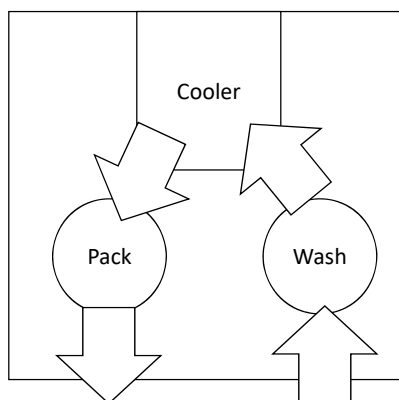
Straight pass setup.

Best suited to buildings with long, rectangular floor plans.



FLOW OF PRODUCT

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



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.)



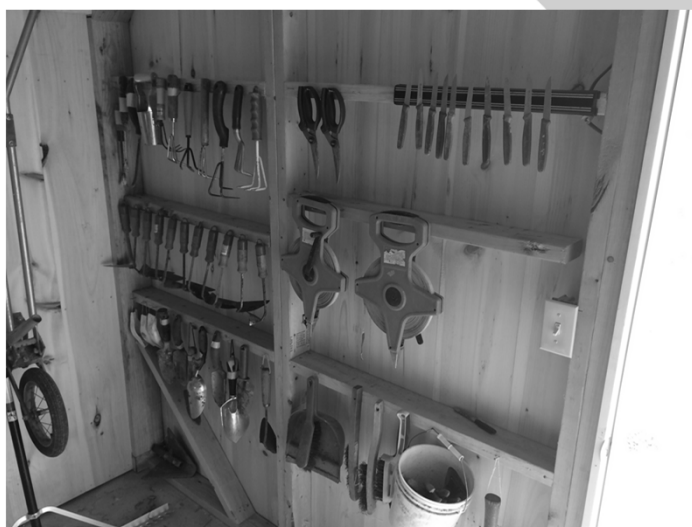
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FLOW OF PEOPLE

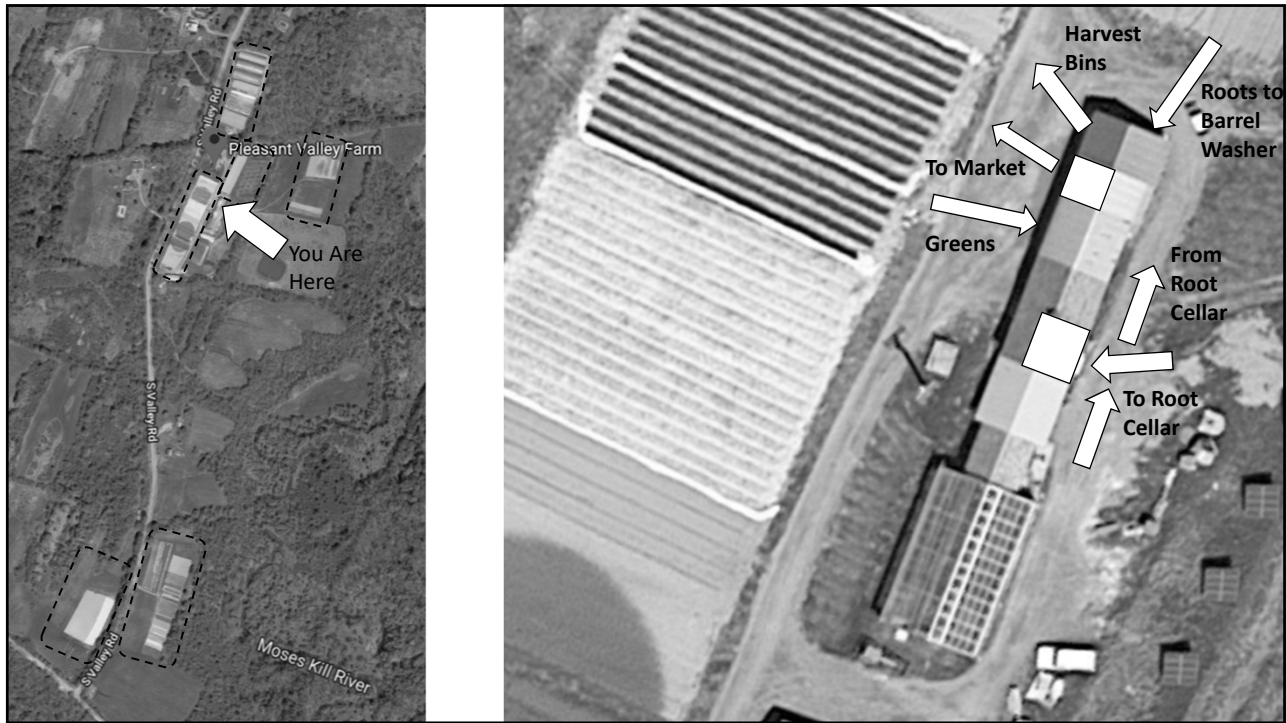
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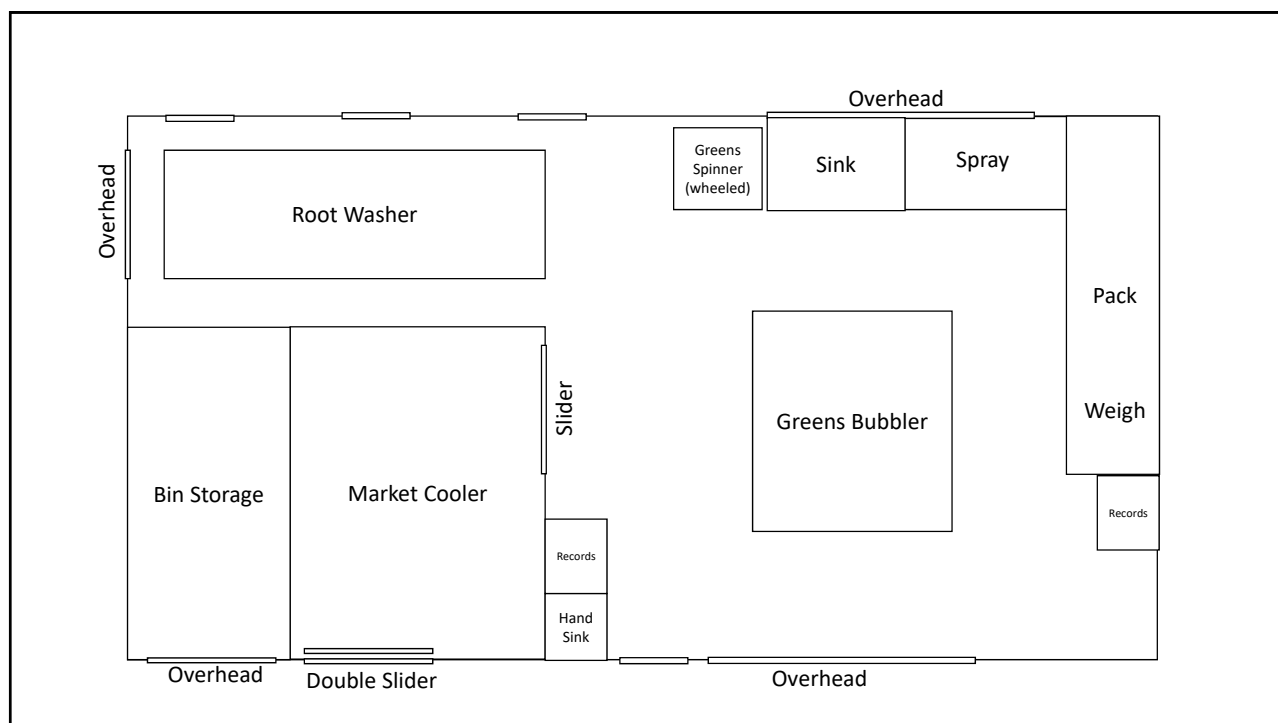




More info – go.uvm.edu/mighty







- Crates on wheels
- Floor Drains
- Knife racks
- Auto front door
- Cement to cooler



EFFICIENT SYSTEMS IN THE WASHING STATION

ANY SCALE, ANY BUDGET...



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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

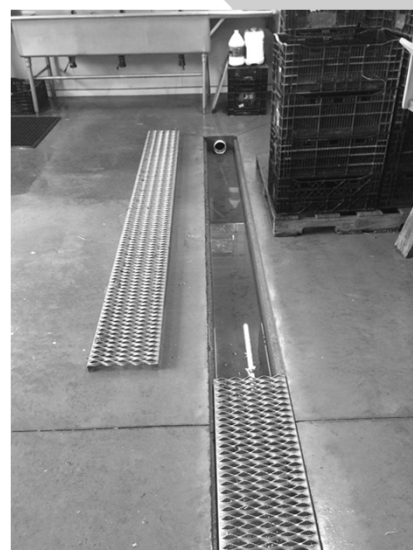


More info - go.uvm.edu/floors



FLOW OF WATER

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



More info - go.uvm.edu/floors



Activity 1: Sketch the Flow Through the Farm

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

15min



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BREAK Root Washer Demo



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Buildings & Infrastructure



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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
 - Heating / Ventilation
 - Adjacent uses
 - Flow, grade, access
 - Budget & Skill

More info - go.uvm.edu/barnplans



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POSTHARVEST 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

Root 5 Farm – Existing Barn Finishing (\$40k)
go.uvm.edu/root5



MORE TO COME!



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

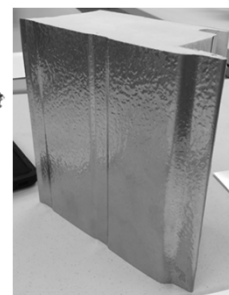
Insulation Options	\$/R/ft2
Spray Foam - Closed Cell	0.1667
Spray Foam - Open Cell	0.1083
Blue Board	0.0968
Poly Iso Board (HiR)	0.0732
Fiberglass Roll	0.0024

More info - go.uvm.edu/coolerwalls



STRUCTURAL INSULATED PANELS

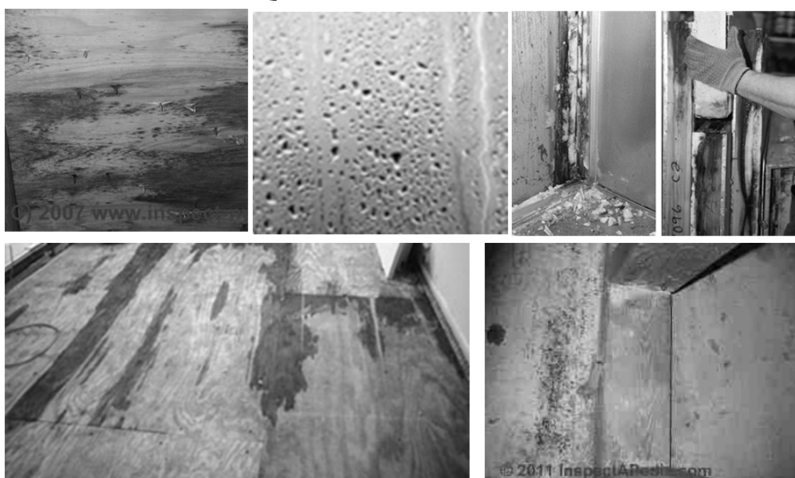
- Pre-fabricated insulated panels that can be used for cooler siding
- Can be load-bearing
- Can be used for roof-insulation
- Think about smooth and cleanable finish surface
- Metal Insulated Panels (MIP) – Cooler Panels



More info - go.uvm.edu/coolerwalls



AVOID BARE WOOD & LIQUID WATER



More info - go.uvm.edu/coolerwalls



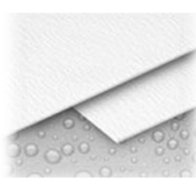
SMOOTH AND CLEANABLE MATERIALS



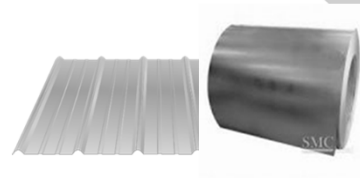
Fiber Reinforced Plastic (FRP)
aka "Dairyboard" \$1.03-1.92 / ft²



WallTuf
\$1.25 / ft²



Galvanized Aluminum
(Galvalum)



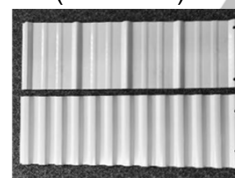
TrussCore
\$1.52 / ft²



Extrutech
\$2.20 / ft²



Utilite
\$1.85 / ft²



Ribcore
\$0.77 / ft²

More info - go.uvm.edu/smoothnclean



RODENT & PEST CONTROL

Remove Food

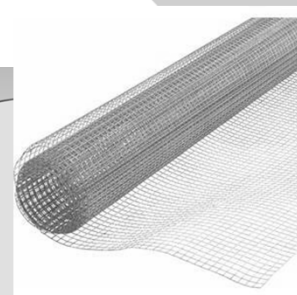
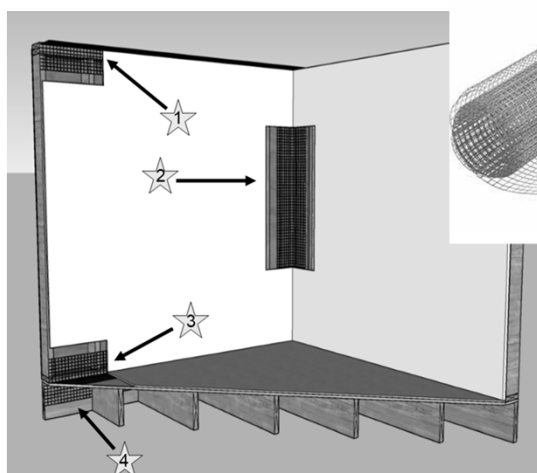
- e.g., cull piles

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



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™!



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Equipment



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DUNK / DUMP TANKS



Bubbler!



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DOUBLE / TRIPLE BAY SINKS



More info – go.uvm.edu/sinks

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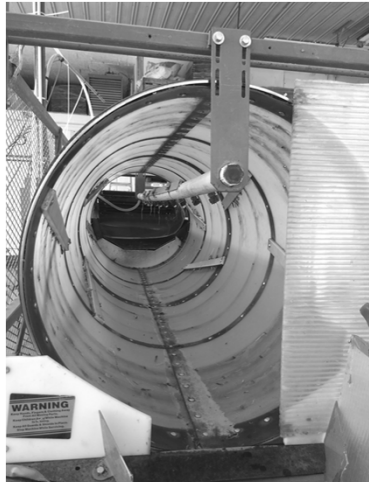
More info – go.uvm.edu/sinks



More info – go.uvm.edu/sinks



DRUM / BARREL WASHERS



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BRUSH WASHERS



How do you clean this?

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RINSE CONVEYOR



More info - go.uvm.edu/rinseconveyor



More info - go.uvm.edu/rinseconveyor



SPINNERS

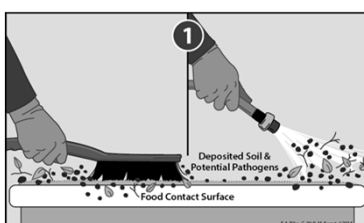


More info - go.uvm.edu/greensspinners

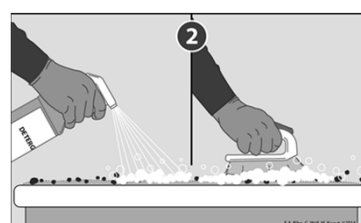


Cleaning & Sanitizing Food Contact Surfaces

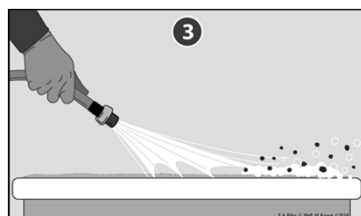
1: Remove any obvious dirt and debris from the food contact surface



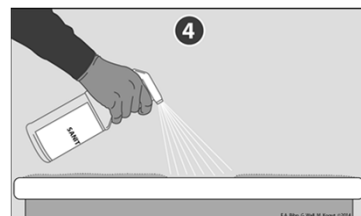
2: Apply an appropriate detergent and scrub the surface



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.



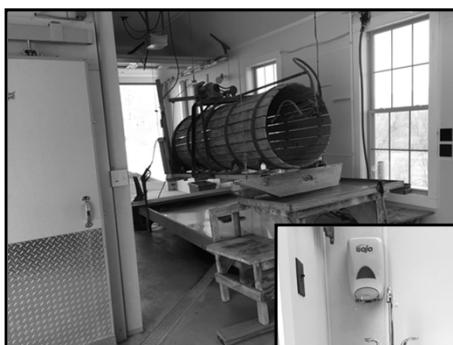
Produce Safety
ALLIANCE

COOLERS

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



EQUIPMENT AT PVF



Tools



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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



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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?



More info - go.uvm.edu/totes



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



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



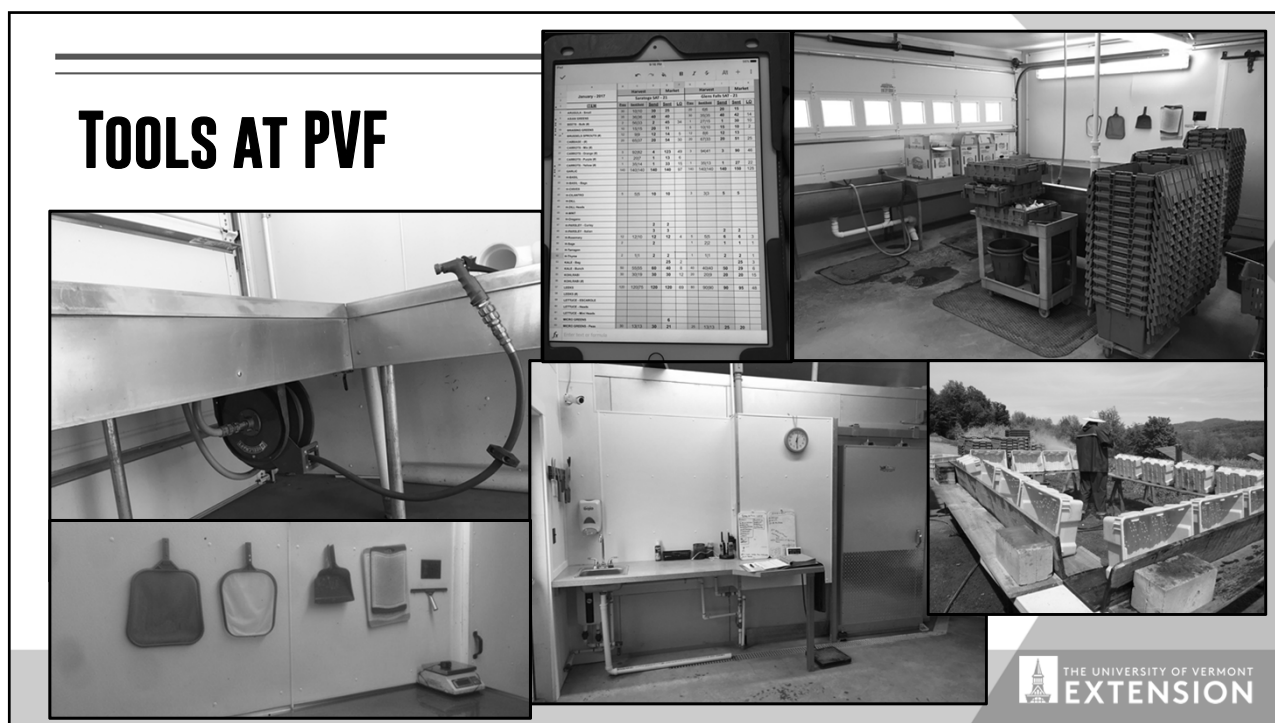
SIMPLE WORKS, TOO.



More info - go.uvm.edu/monitoring



TOOLS AT PVF



Activity 2 Sketch Packshed Flow (20 min)

LUNCH &

Activity 3 Equipment Layout/flow (30 min)

(Planning the details of your improvement project)

Q&A with the team

Sharing with the Group (20 min)

Wrap up, Parking Lot Questions, Evals (10 min)

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