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SEPTEMBER 1, 2026



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Protecting the Fortress

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Protecting the Fortress



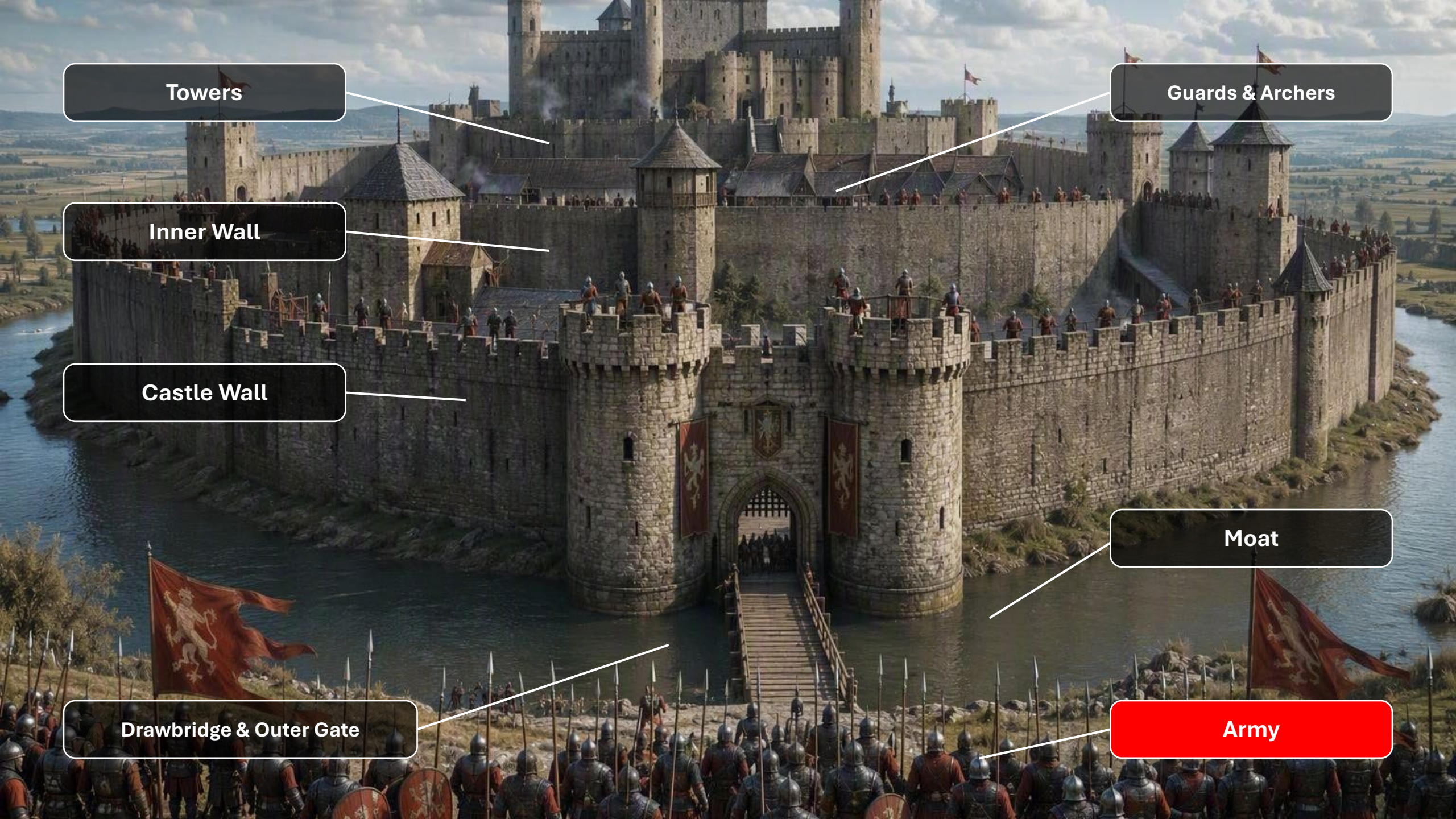
LAYERS OF
PROTECTION



BIOSECURITY
PRINCIPLES



CLEAN-DIRTY LINE
EXAMPLES



Towers

Guards & Archers

Inner Wall

Castle Wall

Moat

Drawbridge & Outer Gate

Army

**Army/Threat-
Viruses & Bacteria
outside the Farm**

**Drawbridge & Outer
Gate – Booties, Clean
and Disinfected
Vehicles**

**Moat – Downtime
to Enter the Site/Farm,
connections with other
farms**



**Guards &
Archers -
Disinfection of
Feet, Hands**

**Inner Wall =
Shower**

**Towers – Danish
Change**

**Castle Wall -
Bench**

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Known threats to the fortress

Animals	Things Entering	Things Leaving	People
Pigs	Transport	Mortality Removal	Team members
Rodents	Supplies	Manure Removal	Visitors
Wildlife	Equipment	Transport	

Do this exercise on farm!

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Be aware of Trojan horse

- "Farm essentials that could inadvertently be sources of contamination"
 - Supplies
 - Emergency equipment
 - Origin
 - Last contact
- Every vehicle has potential to be a Trojan horse



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Protect the supply line-Fortress essentials

- Where did it come from?
- Who or what transported it to the farm?
- Have items been cleaned & disinfected?
- Do we have time to allow downtime on the item after farm entry? Emergency item?
- How is the item handled after arrival?
- External and internal item inspections



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Biosecurity Principles

Viruses are Decontaminated Through



Temperature



Time



Disinfection

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Biosecurity Principles

- Items Must Be CLEAN for Virus Decontamination to Be Successful



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Biosecurity Principles

- Items Must Be CLEAN for Virus Decontamination to Be Successful

Pathogen	Environmental Survival
Mycoplasma hyopneumoniae	Up to 7 days in organic matter
Actinobacillus pleuropneumoniae	Several days in organic matter
Pasteurella multocida	8 days in water, 6 days in slurry
Streptococcus suis	25 days at 48°F, 100 days at 32°F
Salmonella spp.	Years in manure, 115 days in water, 120 days in soil
E. coli	↓ 11 weeks in manure

Pathogen	Environmental Survival
PRRS Virus	3 weeks in organic matter, 11 days in water
Pseudorabies Virus (PRV)	18 days on steel, 2 days in manure
TGE/Porcine Respiratory Coronavirus	Low survival in summer; stable when frozen
Influenza A Virus (IAV)	24 to 48 hours
Ascaris suum	Years

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Table 2: Summary of pathogen inactivation in vitro using known concentrations of virus and bacterial stocks

Pathogen	Time to inactivate, min						
	80°C	75°C	70°C	65°C	60°C	55°C	50°C
PEDV	< 1	15	15	45	> 60	> 60	> 60
PRRSV	< 1	< 1	< 1	5	10	60	> 60
SIV	< 1	< 1	< 1	< 1	< 1	3	60
TGEV	< 1	< 1	< 1	< 1	10	30	30
Rotavirus	< 1	< 1	< 1	< 1	< 1	15	15
<i>Streptococcus suis</i>	--	--	< 1	3	3	10	45
<i>Actinobacillus pleuropneumoniae</i>	--	--	< 1	< 1	< 1	< 1	4
<i>Escherichia coli</i>	--	--	< 1	2	3	10	60
<i>Salmonella</i> Typhimurium	--	--	< 1	10	NA*	15	60
<i>Brachyspira hampsonii</i>	--	--	< 1	< 1	< 1	2	15

* No colonies were seen at this temperature.

PEDV = porcine epidemic diarrhea virus; PRRSV = porcine reproductive and respiratory syndrome virus; SIV = swine influenza virus; TGEV = transmissible gastroenteritis virus.

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Biosecurity Principles

Disinfectants kill viruses by chemically breaking down or destroying their outer protective layers—either the fatty lipid envelope or the protein shell (capsid)—and disabling the genetic material inside so the virus can no longer replicate

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Biosecurity Principles

- Classes of Disinfectants/Degreaser
 - Acids
 - Alcohols
 - Aldehydes
 - Alkalis
 - Chlorine Compounds
 - Peroxide Compounds
 - Phenols
 - Quaternary Ammonium Compounds

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Selection
based on
disease target

Antimicrobial Spectrum of Disinfectant Classes

This table provides general microbial spectrums for disinfectant chemical classes.
Antimicrobial activity and characteristics vary with formulation and concentration.

Always read and follow directions on the product label.

Most susceptible	Disinfectant Class	Acids	Alcohols	Aldehydes	Alkalis	Chlorine Compounds	Peroxygen Compounds	Phenols	Quaternary Ammonium Compounds
 General susceptibility of microorganisms to chemical disinfectants	mycoplasmas e.g., <i>M. gallisepticum</i> , <i>M. bovis</i>	+	++	++	++	++	++	++	+
	enveloped viruses e.g., coronavirus, herpesvirus, influenza virus	+	++	++	+	+	+	+/-	+/-
	gram-positive bacteria e.g., <i>Staphylococcus</i> , <i>Streptococcus</i>	+	++	++	+	+	+	++	++
	gram-negative bacteria e.g., <i>Salmonella</i> , <i>E. coli</i>	+	++	++	+	+	+	++	+ ^G
	vegetative fungi e.g., <i>Candida</i> , <i>Aspergillus</i>	+	+	+	+	+	±	+	+
	fungal spores e.g., <i>Trichophyton</i> , <i>Microsporum</i>	+/-	+/-	+	+	+	+/-	+	+/-
	non-enveloped viruses e.g., parvovirus, picornavirus, calicivirus	- ^A	-	+	+/-	+	+/-	-	-
	mycobacteria e.g., <i>M. bovis</i> , <i>M. paratuberculosis</i>	-	+	+	+	+	+/-	+/-	-
	protozoal oocysts e.g., <i>Cryptosporidium</i> , <i>Giardia</i>	-	-	-	+/- ^D	-	-	+/- ^E	-
	bacterial endospores e.g., <i>Bacillus</i> spp., <i>Clostridium</i> spp.	+/-	-	+/- ^C	+/-	+	+/- ^F	-	-
Most resistant	prions e.g., BSE, scrapie, CWD	- ^B	-	- ^B	- ^B	- ^B	- ^B	-	-

Table legend: ++ = highly effective; + = effective; +/- = varies with product; - = (no/limited) activity; N = no information available

A. FMD virus is susceptible to acids, aldehydes, alkalis, peroxygens
B. high concentrations of some disinfectants can be effective
C. formaldehyde is sporicidal; glutaraldehyde is not
D. ammonium hydroxide only

E. some have activity against coccidia
F. peracetic acid and hydrogen peroxide are sporicidal
G. QAC are generally not effective against *Pseudomonas*

Data compiled from: Maillard JY. 2013. Factors Affecting the Activities of Microbiocides. IN: Fraise AP et al. (eds), Russell, Hugo & Ayliffe's Principles and Practice of Disinfection, Preservation and Sterilization, 5th ed. 2013; McDonnell G. 2020. Microorganisms and resistance. IN: Block's Disinfection, Sterilization, and Preservation, 6th edition; Quinn PJ et al. Disinfection and biosecurity in the prevention and control of disease in veterinary medicine. IN: Block's Disinfection, Sterilization, and Preservation.

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For more information on disinfection in animal health settings, visit the [CFSPH disinfection website](#).

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Clean-Dirty Line Examples

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Farm Entryway- Good example



- Easy to clean – no mud, water, dirt to bring into the farm

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Farm Entryway- Poor example



- Crowded
- Not enough space for team members to enter at once
- Not enough room for employee personal items

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Farm Entryway- Good examples



- Ample space
- Plenty of room for employees to enter
- Large area for coat storage
- Red bench/clear clean-dirty line

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Farm Entryway- Good example



- Ample space
- Red bench/clear clean-dirty line
- Rail to aide in shoe removal- avoids touching dirty shoes

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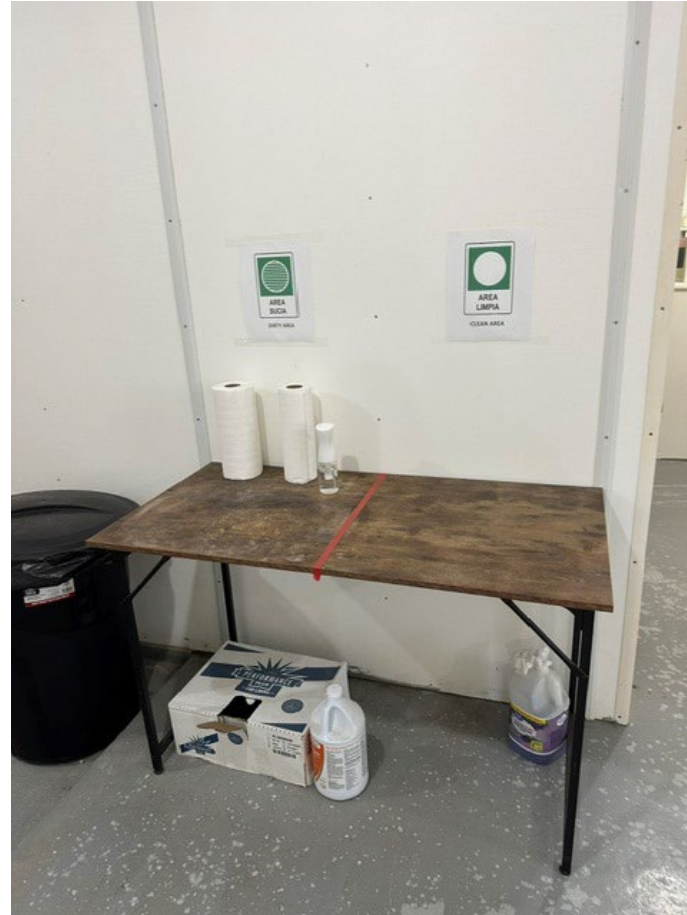
Farm Entryway- Good example



- Ample space, clean, all supplies needed to disinfect properly
- Clean area to set items as they are disinfected for first time
- Secondary decontamination when going through UV

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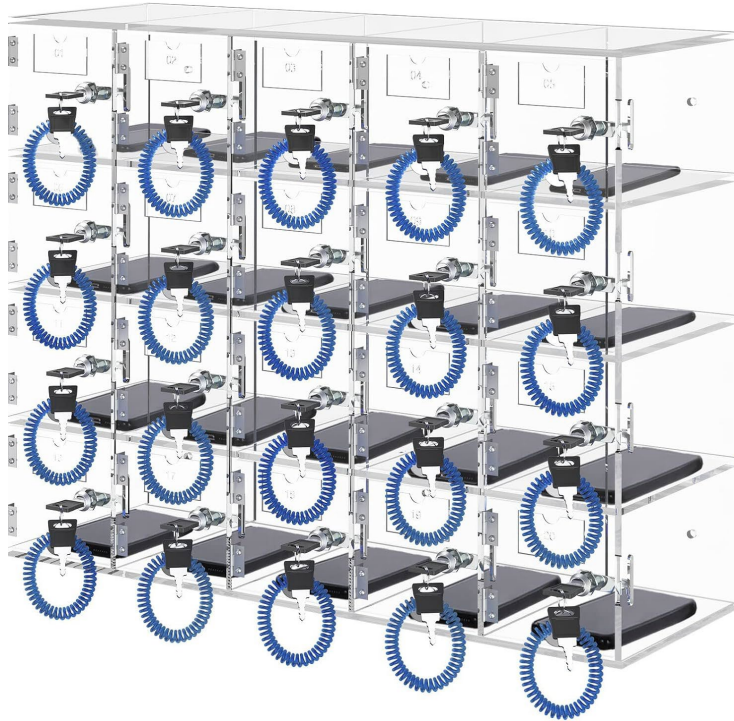
Farm Entryway



- Don't need UV for lunch entry... but do need some way to disinfect or use time or heat to decontaminate
- Consider controlling access to the door on farm side to ensure proper disinfection

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External Entry- Phone, Key storage example



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Farm Entry – Dry Change Room



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Second Location for Clothes for Outside Work (Mortality Removal, Checking Feed Bins, Loading Trailers, etc



- Bathroom
- Washer and Dryer
- Clothes to wear when doing outside activities
 - Dedicated color (red)
 - Dedicated boots (white)
- Separate shower

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Supply Entry – good example



- Extended downtime
 - Routine supplies
 - Larger items for projects
- Clear signage for visitors

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Supply Entry – poor example



- Too small, only one shelf to place materials
- Fogger doesn't hit all surfaces

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Supply Entry – good examples



- Large, a lot of room to place supplies
- Heated
- Clean with materials present to clean effectively
- Two forms of disinfection – physical spray with pump sprayer and fogger



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Supply Entry – good examples



- Good to have a physical barrier at base of disinfection shelf...BUT how do you disinfect the bottom side of items on the bottom shelf?



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Supply Entry – good example

- Ability to fill and start fogger from outside



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Semen Entry – good example



- Outside access for semen courier
- Clean, easy to disinfect
- Semen cooler turns to be accessible on farm side

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Semen Entry – good/poor example



- External drop location the farm for semen can be good but...
 - Needs to be cleaned, not used for high-risk activities
 - Needs to have biosecure and temperature-controlled way to move semen from external location to main farm

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Mortality Removal – poor examples



- Difficult to scoop up all mortalities
- Poor drainage of liquids



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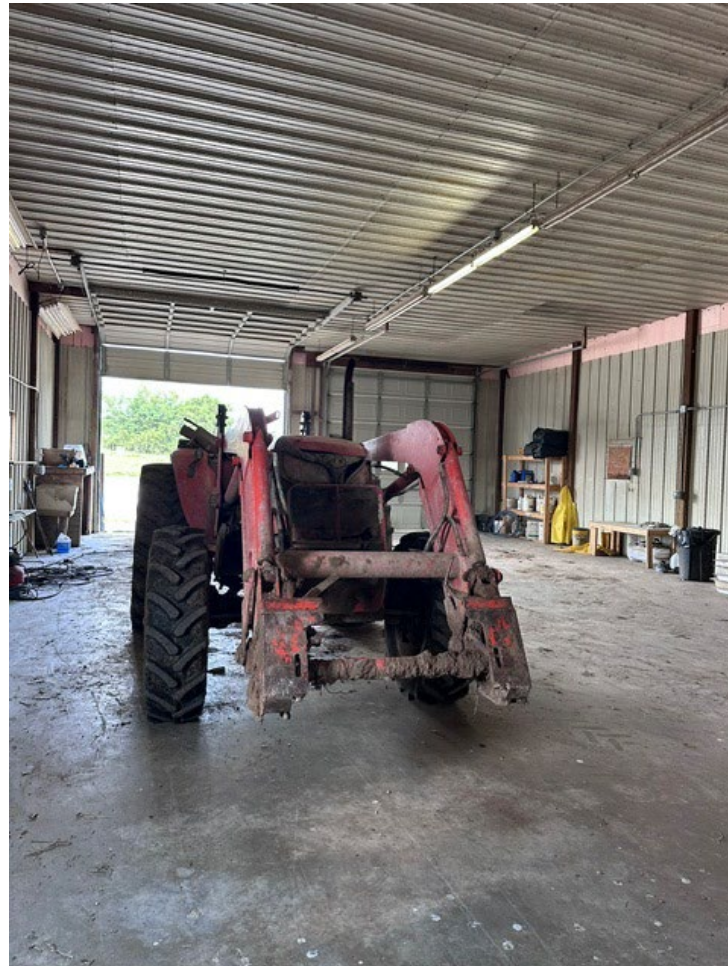
Mortality Removal – poor example



- Poor containment of leachate
- Carcasses not well covered

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Mortality Removal – poor example



- Can we effectively clean the tractor and equipment regularly?

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Mortality Removal – good example



- Completely vulture/eagle/bird proof with bird netting and doors that close properly

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Mortality Removal – good example



- Elevated drop
- Concrete pad that can be cleaned
- Drain away from building

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Mortality Removal



- Freezer strips
 - Pros – can go in/out with tractor without opening
 - Cons – not durable and do not last very long, sometimes vultures will fly under them



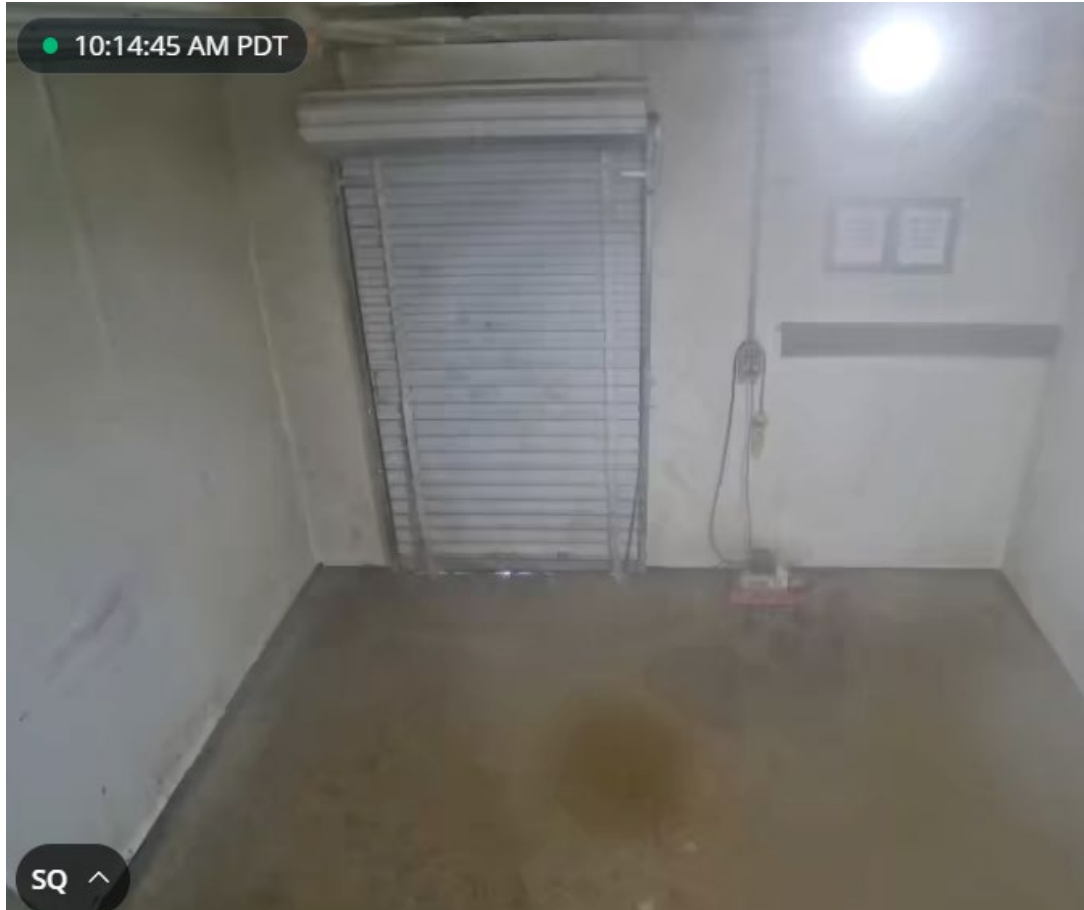
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Mortality Removal – good example



- Incinerator
 - High Volume
 - Can handle all daily mortalities on most days
 - No outside inputs needed

Mortality Removal- Internal management- Good Example



- Clean, washed & disinfected
- Not being used as storage
- No leftover mortality

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Loadouts – poor examples



- Door not secured
- Load out dirty from prior load
- Poor drainage, fluid accumulation from prior loads/mortality removal

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Loadouts



- Easy to clean
- Drains away from the loadout
- Loadout door closes securely

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Loadouts



- Do external trailers need to enter farm at all?

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Loadouts – good example



- Entire trailer is held in loadout prior to opening external loadout door
- Positive pressure
- Outside entry to load the chute with shower
- Easy to clean, drain, decontaminate

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Rodent/Bird Control – poor examples



- No bait stations
- Feed on pads, rock to feed rodents
- Weeds, garbage, equipment in buffer strip

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Filtration



Becoming more and more important with current viruses and amount of PRRS in the industry

Evaluate break rate of your farm, regional hog density and economics of filtration with your veterinarian



In pig dense areas, filtered farms continue to out perform non-filtered farms



Think about year-round filtration

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Biosecurity Audits- Testing the Fortress

- Daily – Farm Manager
- Daily – Cameras + Third Party Auditing
 - TIMELY follow up at farm level!
- Monthly/Quarterly - External Audit of Some Sort
 - SEE the actions happen in real time
 - ASK open ended questions
 - Bilingual auditor can be helpful
- Test with glow germ

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When the wall is breached

- Encourage self-reporting
 - Cameras help accountability
- Breaches are not the end of biosecurity- response determines damage potential
 - Can the breach be contained or mitigated?
 - Can areas of the farm be restricted/treated differently until safe?
- Rebuild the wall!
 - Ask how we can get better- team members are additional guards



A detailed medieval fortress with multiple towers and battlements, situated on a riverbank. The fortress is surrounded by a river, and a wooden bridge leads to the main entrance. In the foreground, a large group of soldiers in full plate armor, holding spears and shields, are lined up on a grassy bank. Two large red banners with a white lion rampant are visible on the left and right sides of the foreground. The sky is blue with scattered white clouds.

**Is Your Farm
Built Like a
Fortress?**

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Take Home Messages

1

Prioritize Riskiest Areas to Have Strongest Protection

- Control what you can control

2

Think About Applying Multiple Layers of Protection

- Pick an analogy and drive home the message with the team

3

Think About Execution First

- Design protocols that are easy to execute day in and day out

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