



SARE Farmer Grant Final Report 2014

Eliminating Chronic Disease Using a Farm-based Approach: Caseous Lymphadenitis (CL)

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CL: What is it?

- 1) “Cheesy gland”: Chronic bacterial infection
Corynebacterium pseudotuberculosis
 - Stays in the immune system
 - May cause skin or internal abscesses
- 2) Can be spread from animal to animal:
 - Must have skin penetration
- 3) Persistent in the environment
- 4) Use antibody response to test for presence of bacteria in unvaccinated animals
- 5) Vaccines are available; not highly effective



CL: What is it?

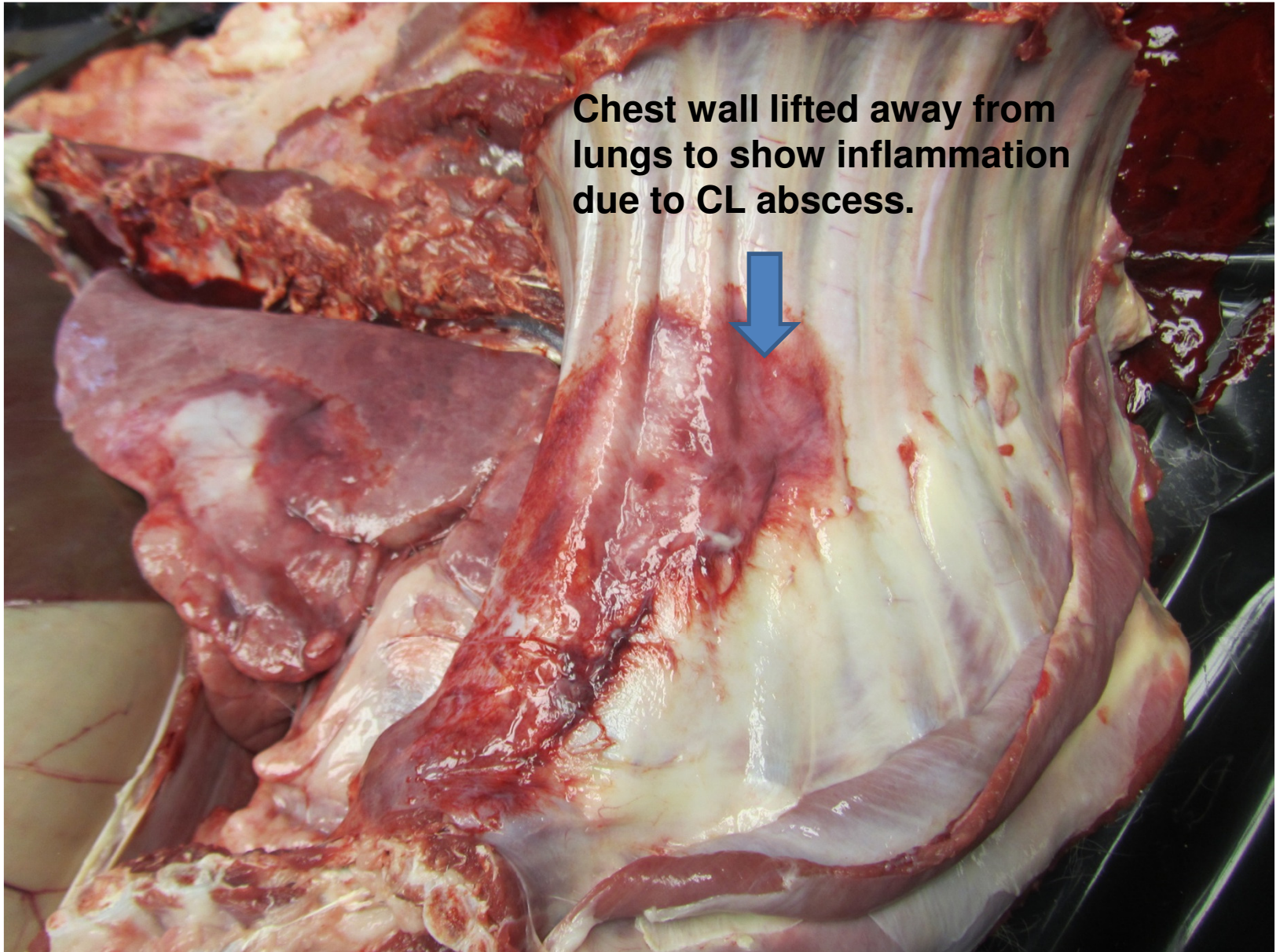


Corynebacterium pseudotuberculosis: lymph nodes

1. External: Firm, dry abscesses- slow to develop
2. Internal: Weight loss, coughing



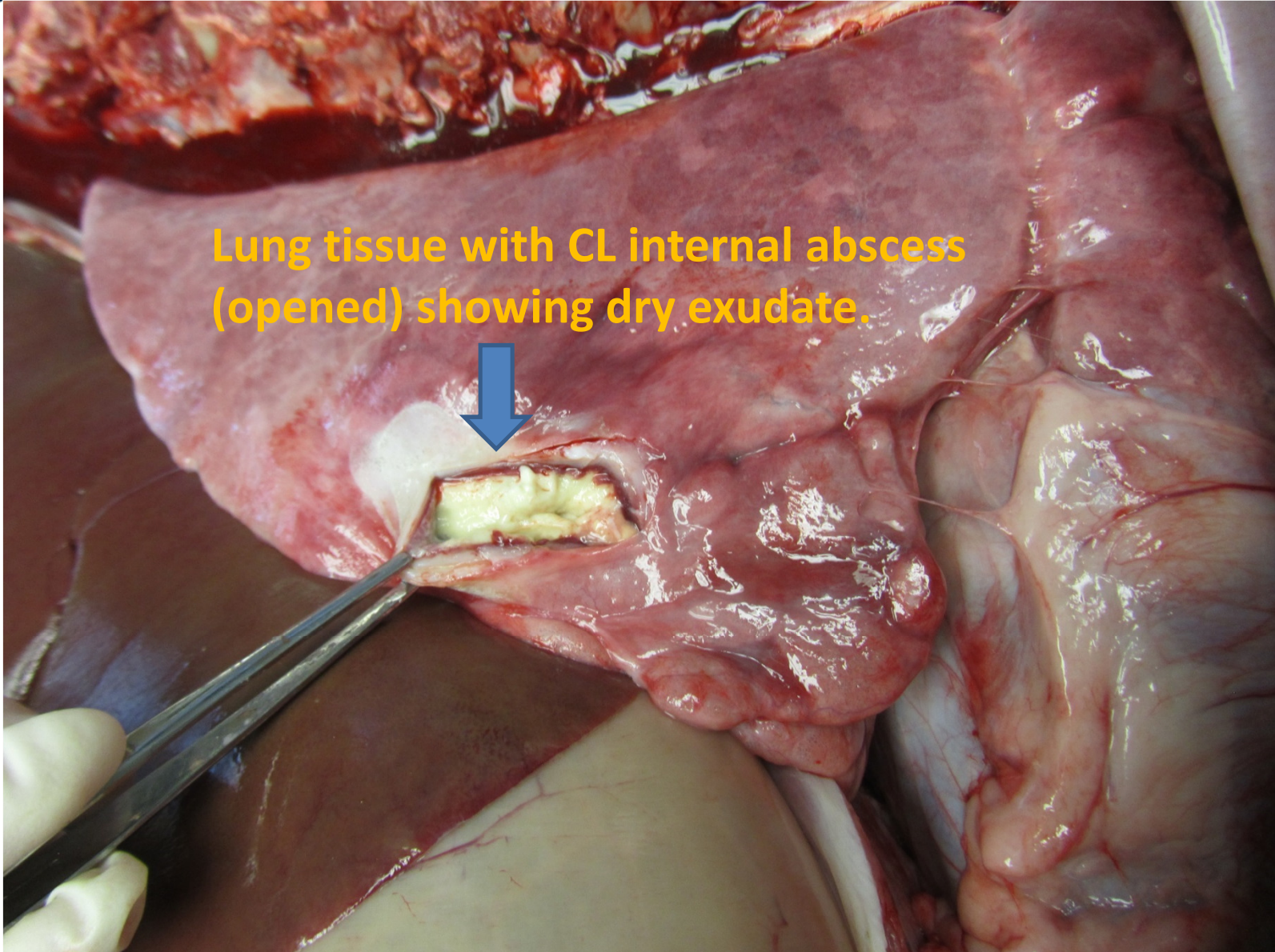
CL: Internal abscesses (goat at necropsy)





CL: Internal abscesses (goat at necropsy)

Lung tissue with CL internal abscess
(opened) showing dry exudate.





CL: How contagious is it?

- Transmissibility
 - Direct inoculation of bacteria into new host
 - Cut or ulcer, contact with exudate
 - Bites from flies that have contacted exudate
 - Rubbing on tree, etc, that has exudate on it
 - Inhalation of infected secretions
 - Sheep with bronchial lymph node abscesses: coughing
 - Milk?
 - If mammary lymph infections present
 - See more recent info (below)





CL: Can it be cured?

- Treatment:
 - Vaccines or antitoxins:
 - Don't prevent or cure, but may decrease abscesses
 - Immune clearance ineffective
 - Toxins overcome normal immune defenses
 - “Hides out” inside cells
 - Uptaken by macrophages; survives and is spread to lymph nodes
 - Antibiotics
 - In vitro, many are effective
 - In vivo, nothing works: food animal limitations re antibiotics
 - Rifampin with tetracycline was useful in early infection
 - » Judson et al, 1991. Veterinary Microbiology 27(2): 145-150
 - » Senturk and Temizel, 2006. Veterinary Record 159(7): 216-217



CL: How long does it last on my farm?

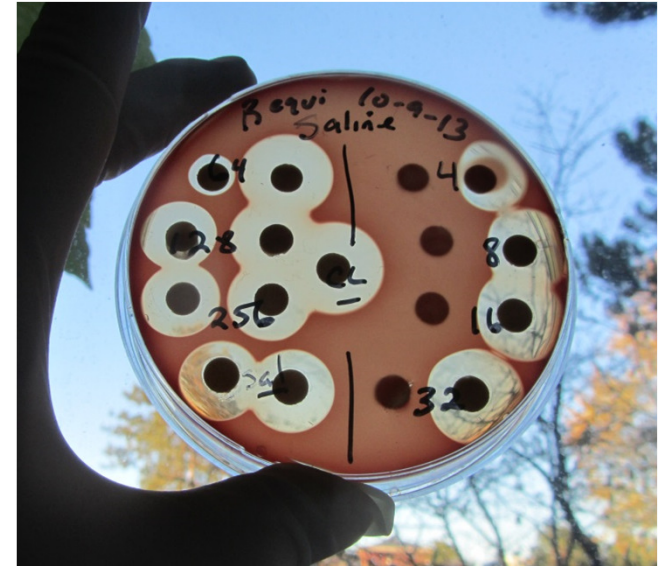
- Non-spore former, but environmentally stable
 - *C. pseudotuberculosis* wasn't killed by 4 months in soil samples containing exudate from CL abscesses, and after 11 months in sterilized soil samples (40° F, 72° F, 98 ° F and ambient conditions)
 - *C. pseudotuberculosis* was killed after 3 hours in chlorinated tap water, but could survive up to 70 hours in distilled water.
 - Disinfectants: many are effective against CL after thorough cleaning of surfaces
However: *rough surfaces such as wood may be impossible to disinfect*





CL: Can I detect or prevent it?

- Detection:
 - Exposed animals: PLD antibodies
 - Test based on detecting antibodies
 - “Seropositives” carry the bacteria
- Prevention:
 - Vaccines not 100% effective
 - Boosters, accurate records needed
 - Vaccine will NOT cure, only help prevent abscesses
 - Using vaccine creates “seropositives”
 - Testing and culling seropositives: best method
 - *But will this work for all farms?*





Trial Methods

- SARE Grant: CL in Sheep
 - Visit farm: use farm vet if possible
 - Test sheep: 0 and at least 60 days
 - Initial SHI tests done by Washington State University
 - Report results (farm ID confidential)
 - Consultation
 - Biosecurity
 - Tailor methods to farm type
 - Survey
 - SHI test method developed at UMaine lab in Orono
 - Supports local industry
 - Create easier access to vigilance methods
 - Validate CL-free status for producers





Trial Results

- Farm types tested
 - Breeds: Many
 - Products: Fiber, meat, milk
 - Biosecurity: Varied greatly
- CL status
 - 8 of 17 had positive animals at first test (47%)
 - 22% of 705 sheep tested at least once were CL+
 - 8 of 9 negative farms stayed negative (1 didn't retest)
Closed herd and good biosecurity essential
 - Inability to run test locally interfered with outcome
 - At follow-up, most of the positive farms had culled or isolated positive animals





Trial Results

- Biosecurity: example (Farm 2)
 - Breeding for fiber and meat:
Animals may travel off farm: limited or no quarantine
 - Tested “home” animals: all neg.
 - Tested “returned” animals: 1 pos.
 - Retested “home” animals: new positive
- Followup: culled all positives, implemented quarantine procedures for returning animals





Biosecurity Example: Isolated Farm





Biosecurity Example: Farm Layout





Trial Results



- **Farmer compliance**
 - All farmers directly contacted said they would cull
 - Follow-through really varied. “Favorites” or great producers were unlikely to be culled.
 - Most were unwilling to replace wooden feeders or other areas where CL transmission likely.
 - Most thought their biosecurity was excellent
 - All were highly concerned and involved in the success of their flocks
 - Some of the 17 farms had camelids; none had goats
- **Farmers resented “buying” chronic disease**
 - “Do unto others” was a strong motive



Conclusions

- Prevalence higher than expected
- Does being CL-free add to value?
 - “Caveat emptor”: Selling CL free breeding stock=value
- Other species affected: goats, camelids
 - Be careful of guard animals: need testing, too
- Farm type dictates whether vaccination ok
 - Reluctance to cull is common
 - Vaccination takes away possibility of testing
 - No strategy works longterm without culling
- Biosecurity and determination dictate whether disease-free status is achievable



Outcomes

- Awareness of CL increased
 - Added value of CL-free status
- Biosecurity templates in development
 - Google Earth model may help communications about farm layout and biosecurity
- SHI method now in Orono on a research basis
 - Project continuing studying goat dairies in 2014-5
 - Sheep testing available in 2015 if serum samples can be collected/shipped to UMAHL (no charge for testing)
- Decision Tree: Start by knowing your status
 - **Assess the cost** of CL-free status for your farm
 - May not work for everyone

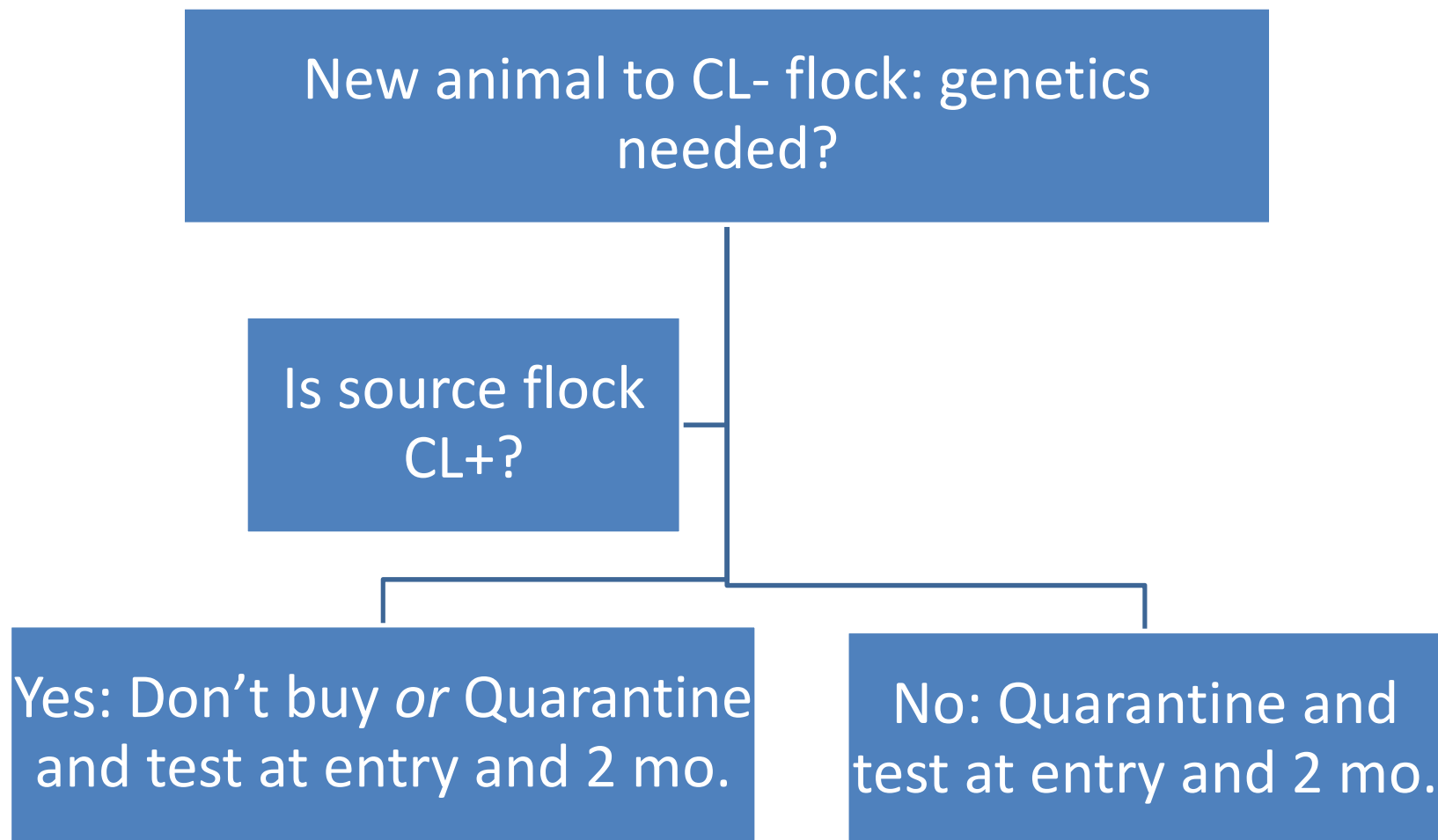


Outcomes: Recommendations

- Know the CL status of your flock: retest as needed
- Maintain closed flock/herd with high biosecurity
 - Notify visitors about biosecurity
 - Inform shearers about biosecurity
 - New or returning animals:
 - Don't immediately mix with "home" flock
 - "nose to nose \neq quarantine"
 - CL test immediately at entry and prior to release from quarantine (2 mo. later)
 - If positive, **cull or sequester** positives
 - » Retest exposed animals at 2 months: cull if +
 - » *Keep quarantined* until all negative for CL at 2 consecutive tests 2 months apart

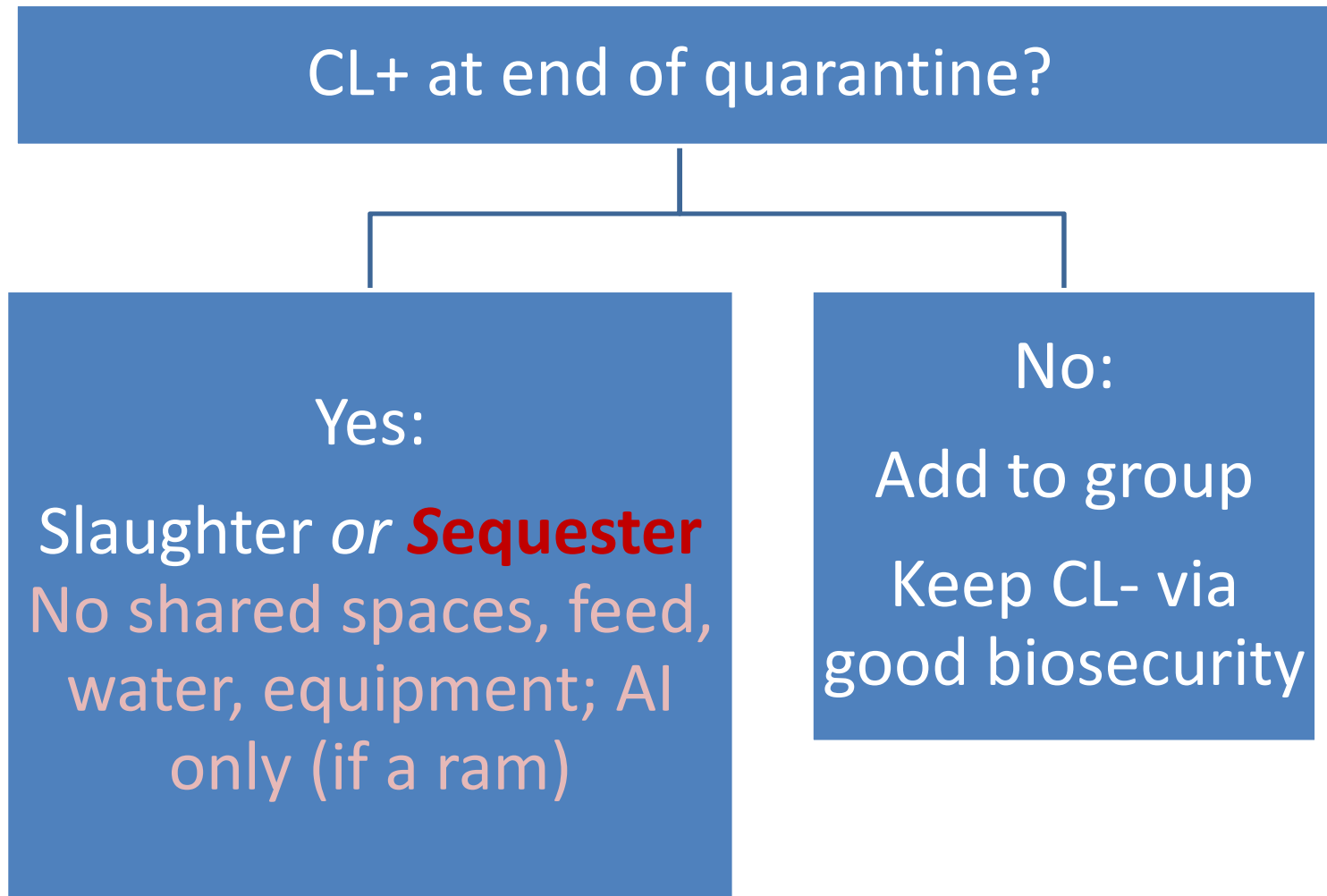


Outcomes: Decision Tree





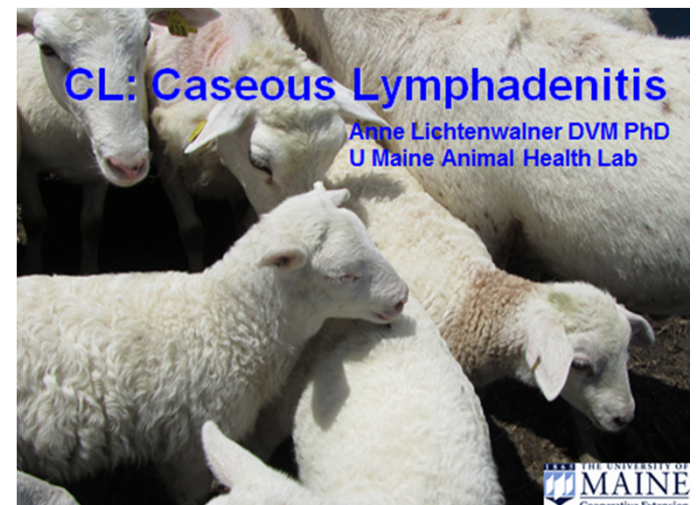
Outcomes: Decision Tree





Impacts

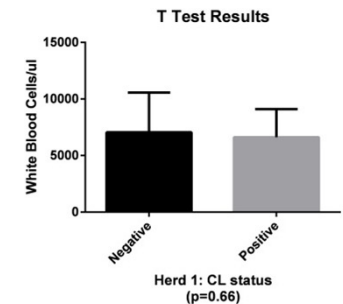
- Stopped CL on several farms
 - Estimated 20% improvement in fiber yields
 - Potentially reduced carcass condemnation
- Outreach to SR vets
 - Free testing may enhance communications
 - Help establish VCPR with farmers
- Farmer-to-farmer:
 - Added value of CL-free stock
 - Building biosecurity awareness
- Students:
 - projects and experience





Recent Undergrad Student Theses on SR

- Edith Kershner: Case study of sheep farms with or without CL.
- Abigail Royer: Detecting CL using complete blood counts.
- Amy Fish: Evaluating macrophage responses to CL.
- Rachel Chase: Evaluating neutrophil responses to CL.
- Cassandra Karcs: CL prevention in small ruminants.
- Hallie Lipinski: CL and its connection to milk.
- Anna Desmarais: Selenium and footrot prevalence.
- Alden West: Composting effects on coccidia.
- Alexandra Settele: Anthelmintic resistance in *H. contortus*
- Amanda Chaney: Identification of internal parasites of sheep and goats
- Caitlin Minutolo: Effect of age on susceptibility to ovine footrot.
- [Nicole Maher: CL webinar for producers](#)
- Casey Athanas: Pedigree analysis to help eradicate footrot.
- Katrina Glaude: Should sheep with footrot be culled?
- Kayla Porcelli: Biosecurity survey for footrot positive farms
- Marie Smith: Pasture management to control parasites in small ruminants.





References

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