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

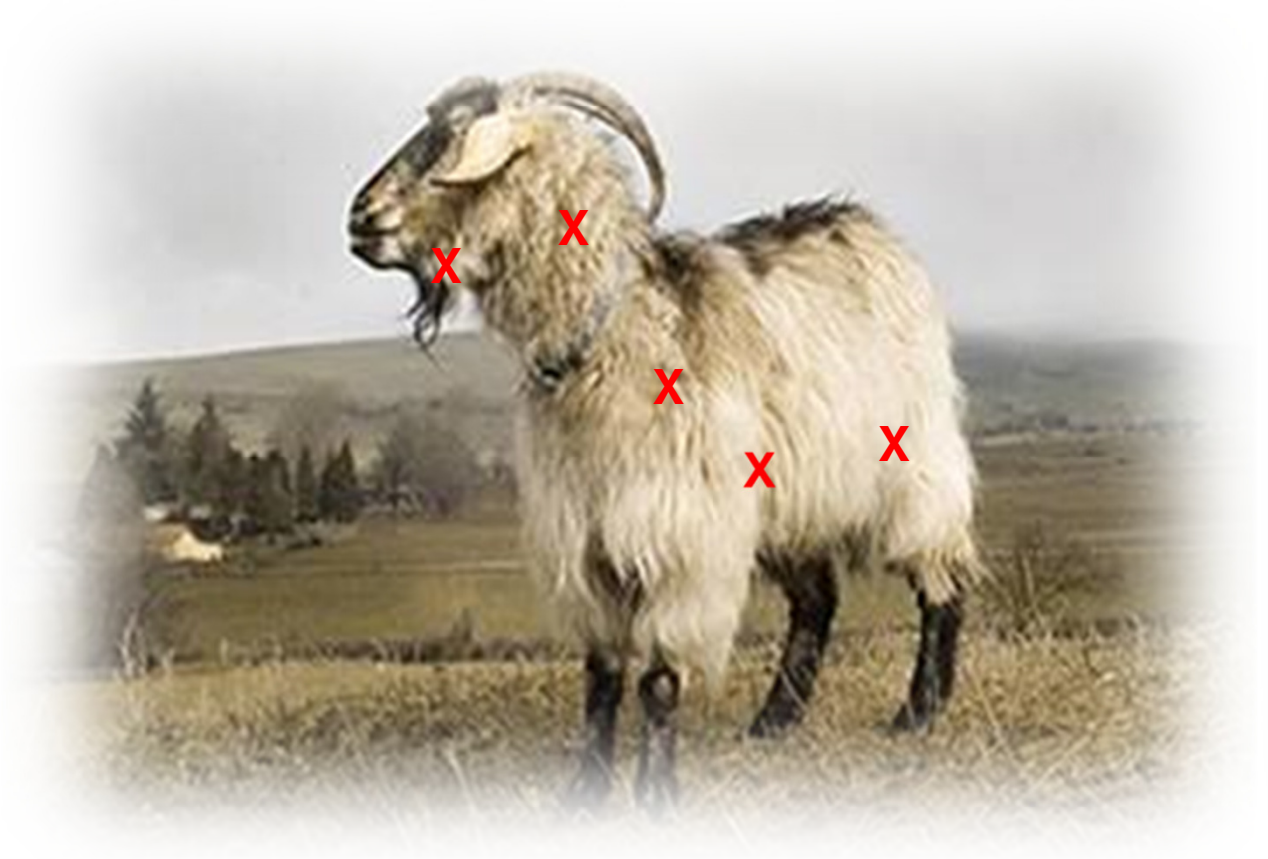
2) Can be spread from animal to animal:
   -Must have skin penetration

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

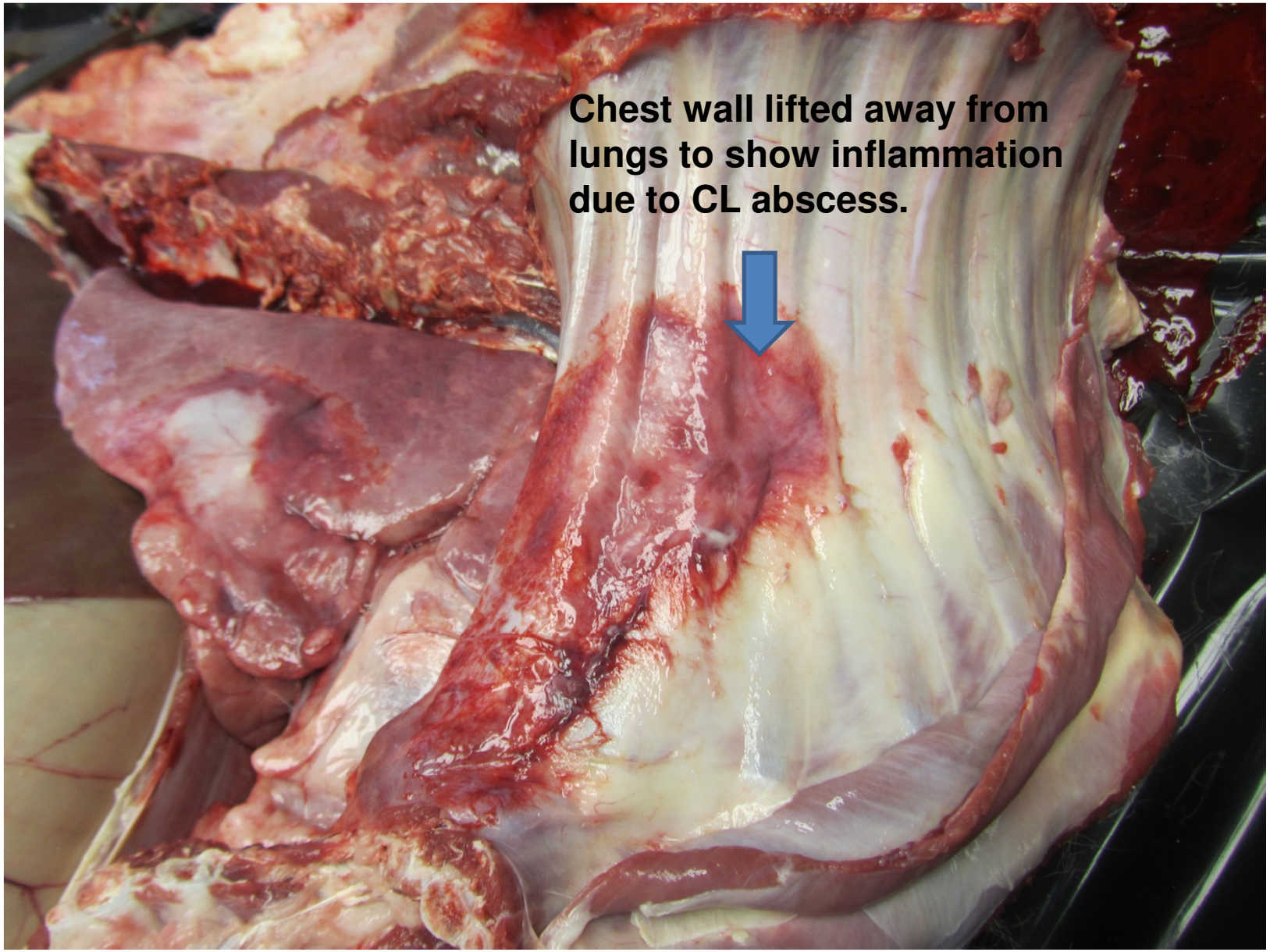
CL: What is it?



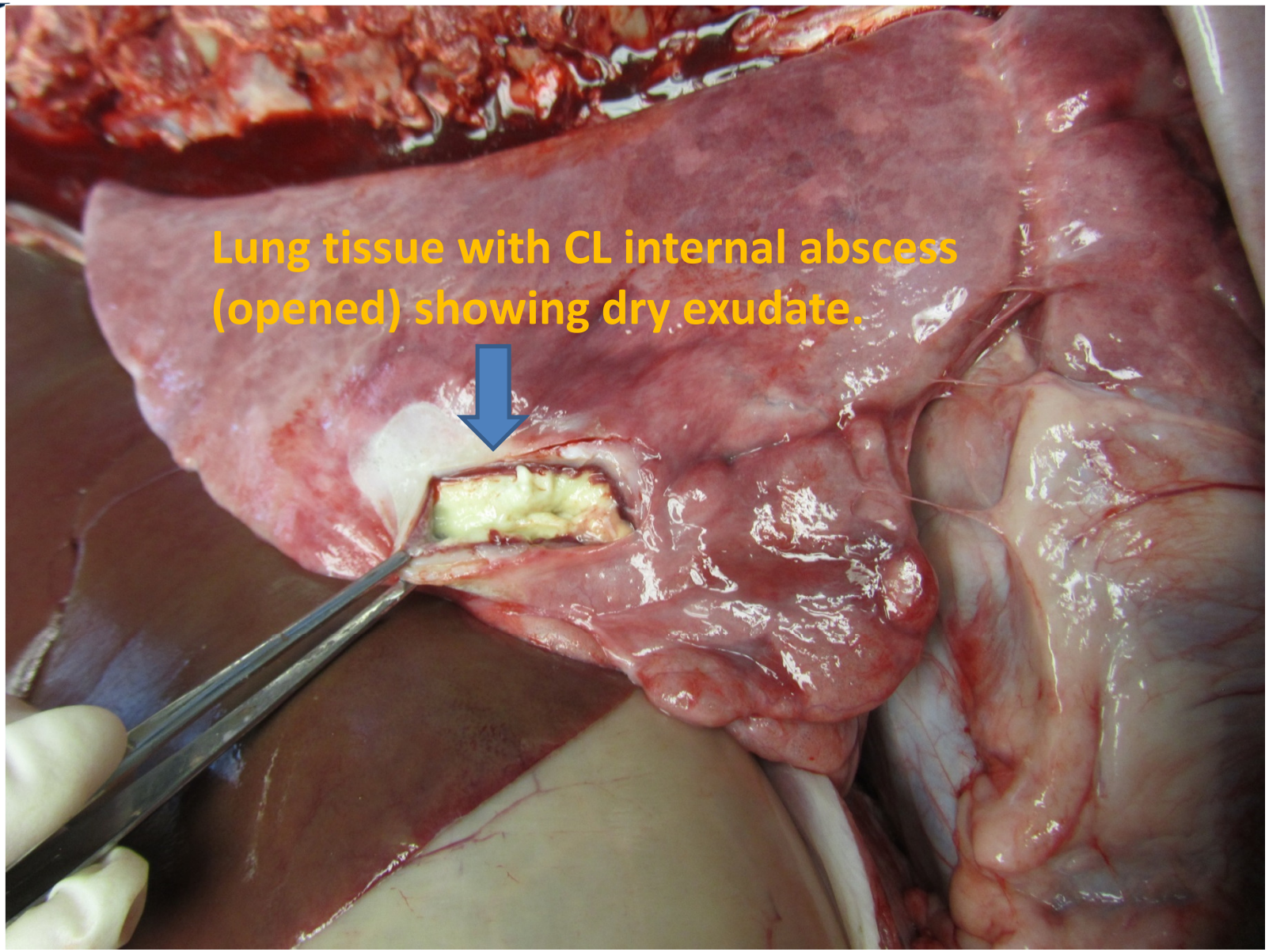
Corynebacterium pseudotuberculosis: lymph nodes

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)



CL: How contagious is it?

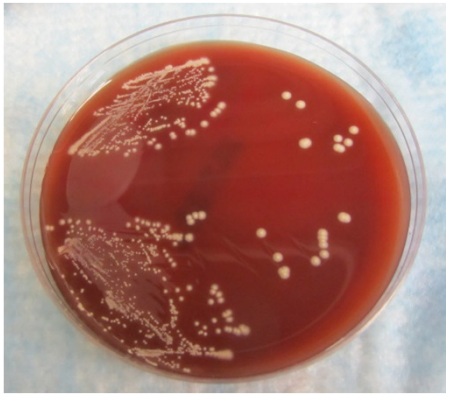
- Transmissibility
  - Direct inoculation of bacteria into new host
    - Cut or ulcer, contact with exudate
    - Bites from flies that have contacted exudate
    - Rubbing on tree, etc, that has exudate on it
  - Inhalation of infected secretions
    - Sheep with bronchial lymph node abscesses: coughing
  - 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 (40º F, 72º F, 98 º 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

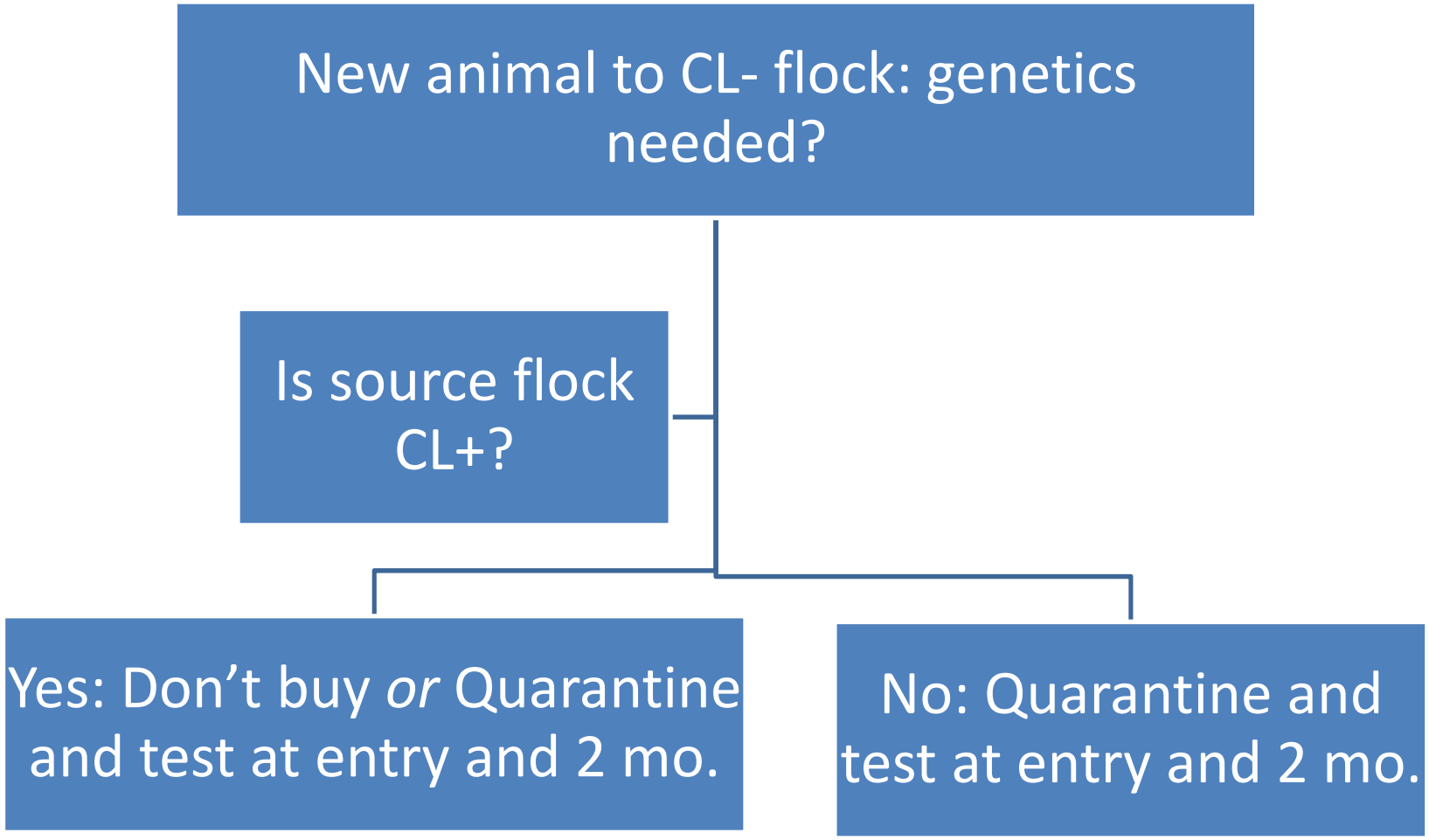
Outcomes

- 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

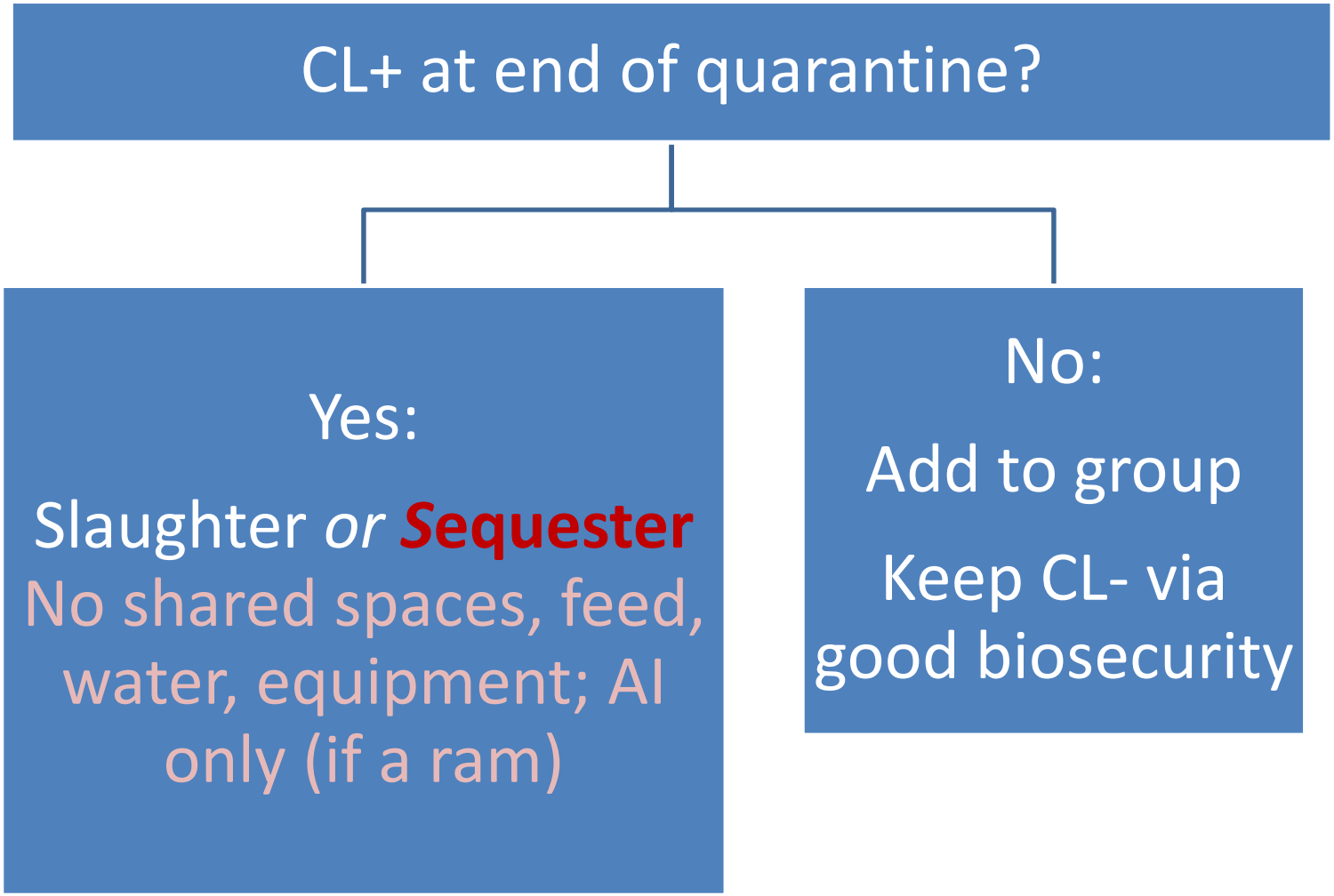
Outcomes: Recommendations

- 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 ≠ 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

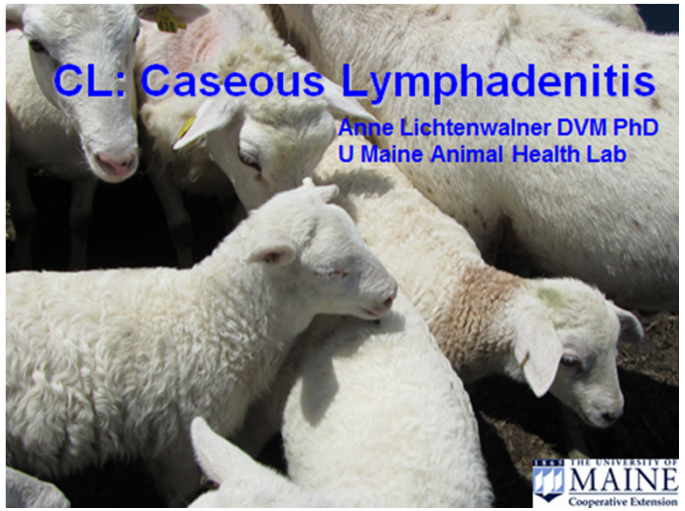


Outcomes: Decision Tree



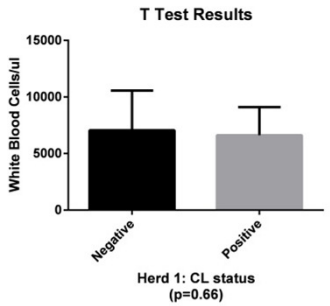
Impacts

- 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.



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