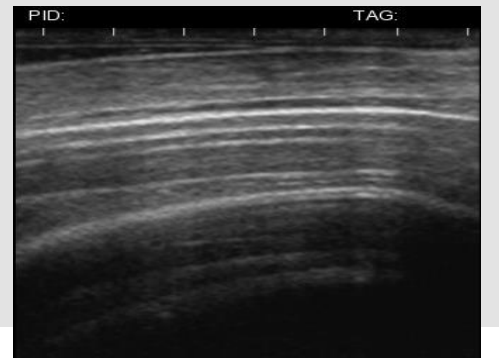


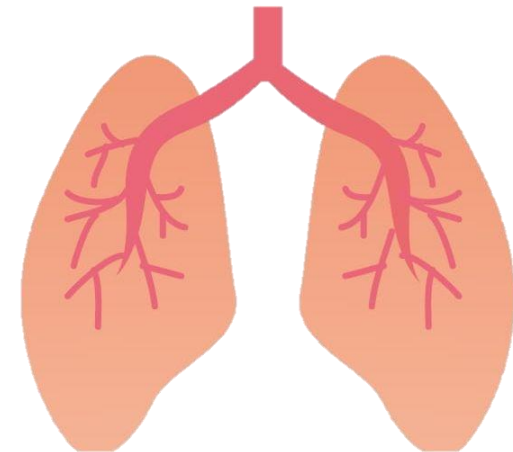
Practicality of using on-farm lung scanning as a diagnostic tool for respiratory disease

Tabby Steckler Hurst



Bovine Respiratory Disease

- Disease of the upper or lower respiratory tract
- 2nd leading cause of illness in dairy calves



BRD Incidence Rate



- National Animal Health Monitoring System – USDA
 - Heifer Raiser (2010): 11% pre-weaned and 5% weaned
- 1,141 BRD animals on 4 farms (Heins et al., 2014)
 - Average incidence rate: 61%
 - Range: 20.7% to 89.9%
- 104,100 BRD animals diagnosed up to 120 d (Overton, 2019)
 - Average incidence rate: 36.6%

For every clinical BRD cased there are 2-4 calves with subclinical BRD illness (Ollivett, 2019)

Economic Impact of BRD

\$245/ heifer

Treatment Costs

Reduced ADG

Increased Raising Costs

Increased morbidity and mortality

Decreased Milk Production

Lung Scanning in the Press

NEWS

#WeanClean™ Focuses on Healthy Lungs for Dairy Calves



Calf lung scan protocol empowers profitable decisions

Progressive Dairy Editor Peggy Coffeen Published on 07 May 2021



Turn the Tide Against BRD by Improving Diagnostics and Treatment Protocols

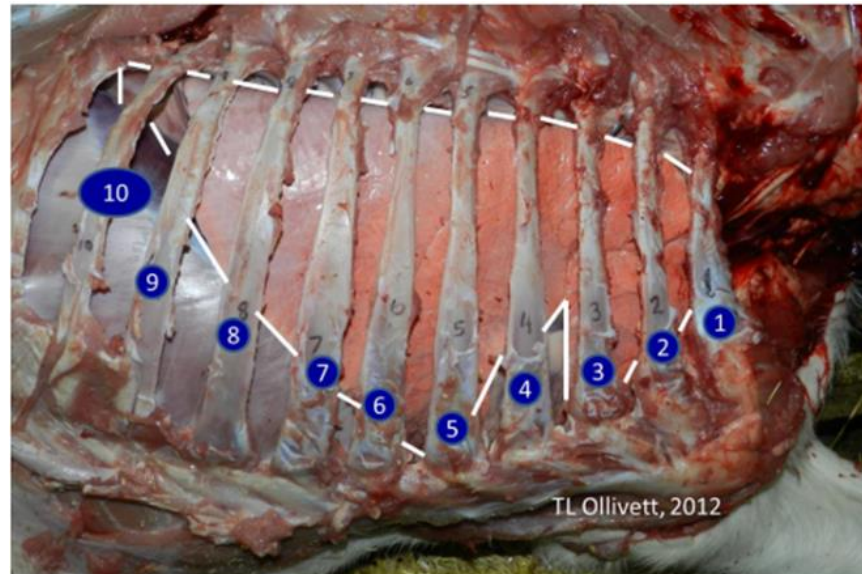
Sponsored content created and provided by Curt Vlietstra, DVM, Boehringer Ingelheim



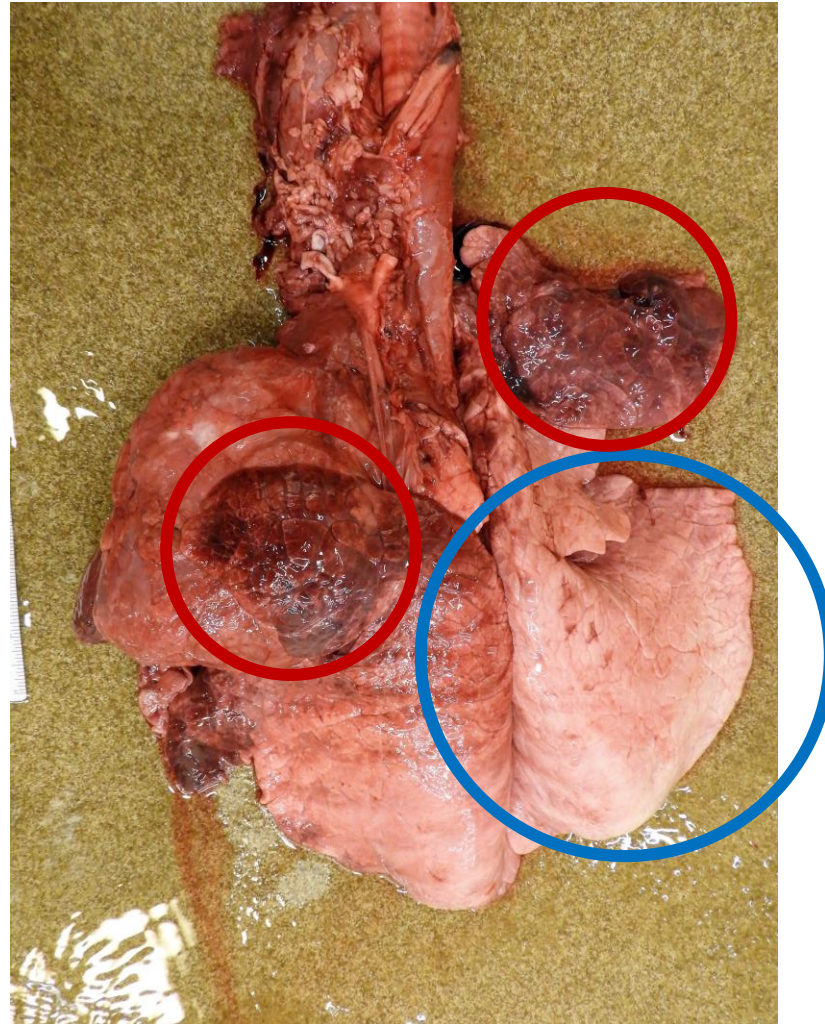


Lung Scanning Procedure

Lung Scanning Technique



Lung Tissue Anatomy

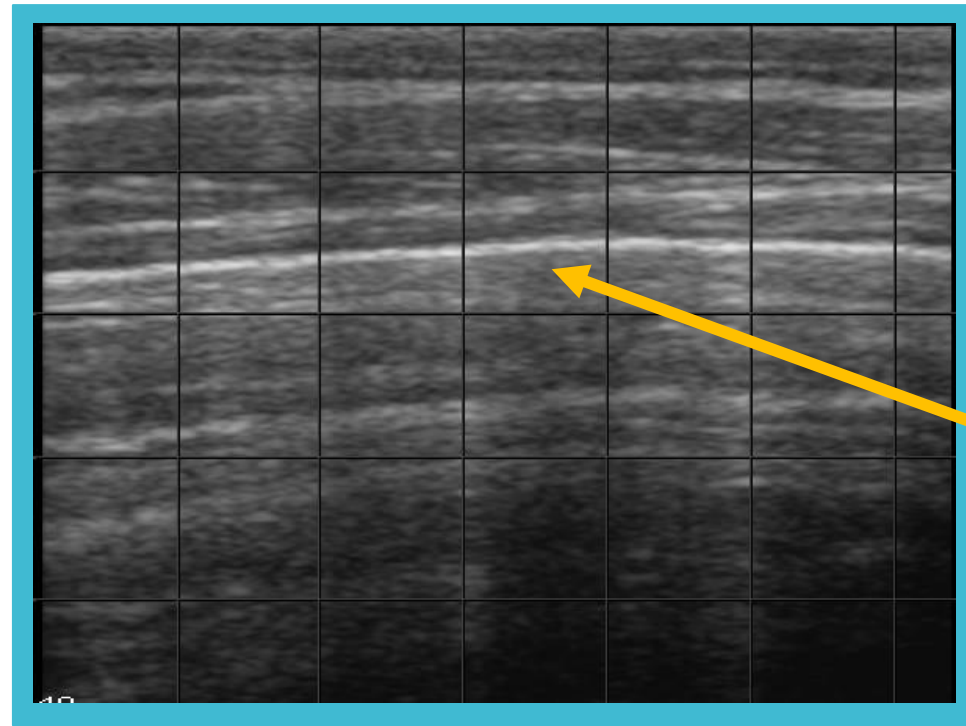


Lung consolidation: airways filled with other substances (liquid, pus, water, cells, etc) that is NOT air.

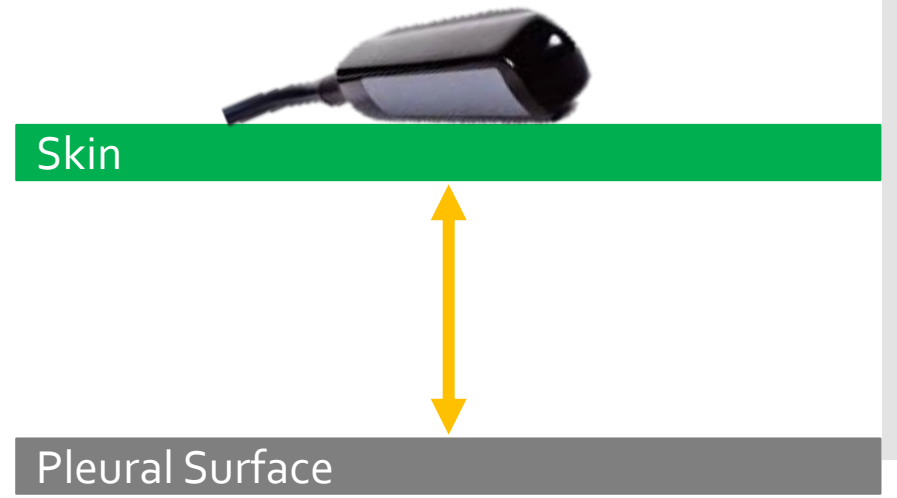
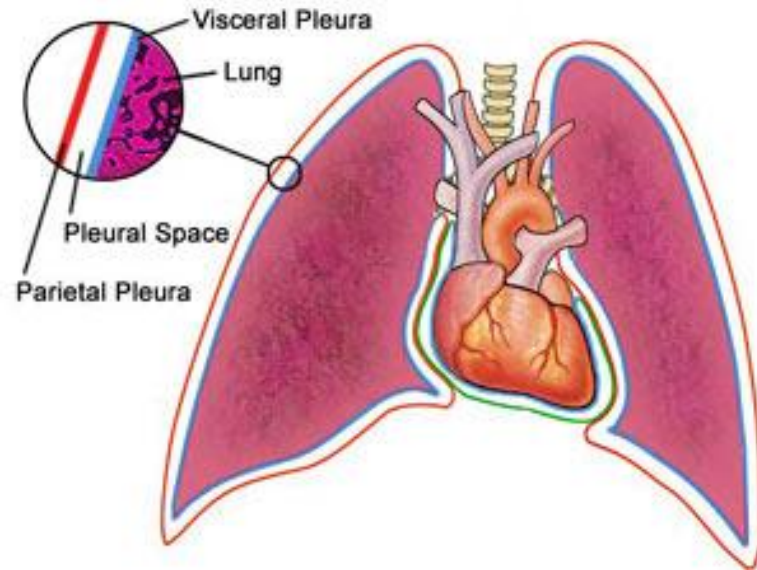
- Healthy Lung
- Unhealthy Lung

Lung Scan Anatomy

- Healthy Lung
- Unhealthy Lung

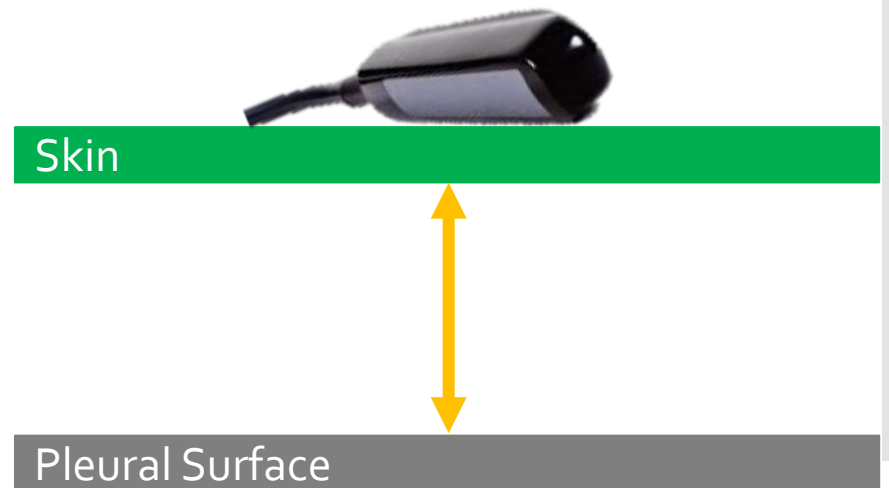
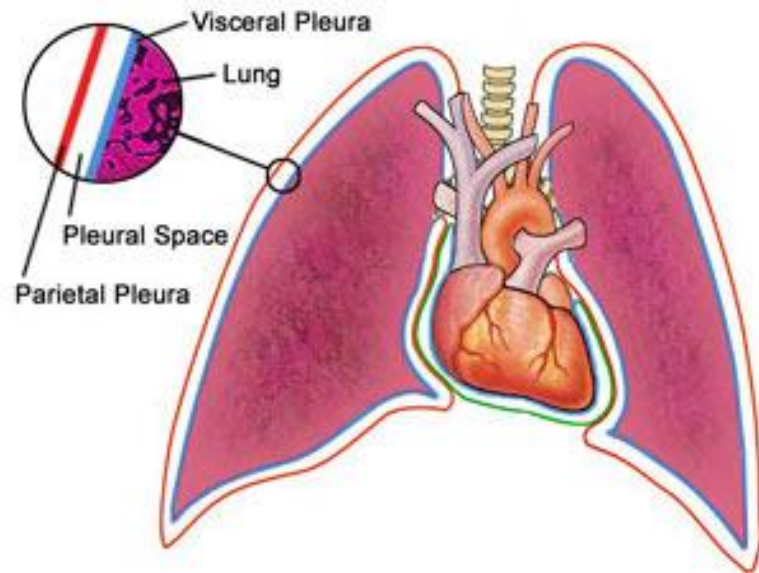
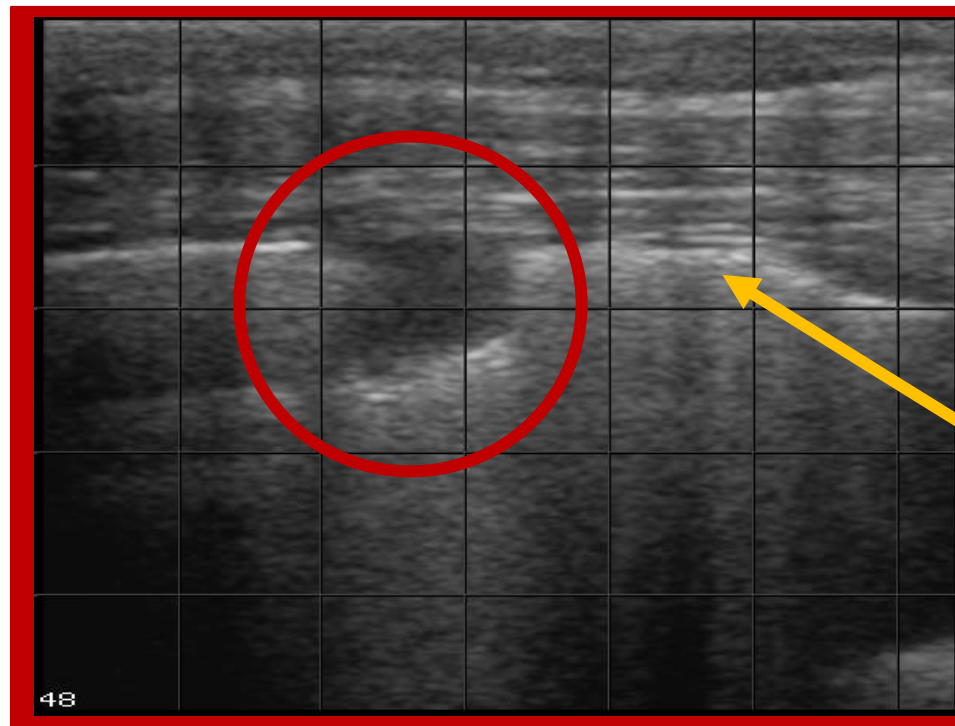


Pleural Surface

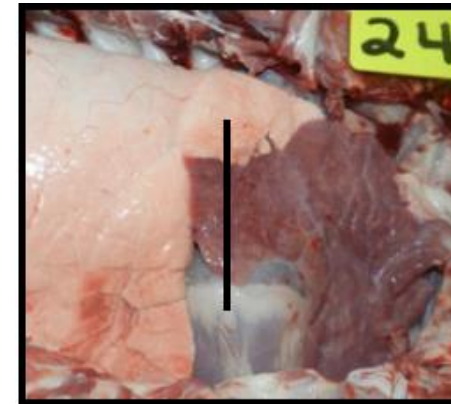
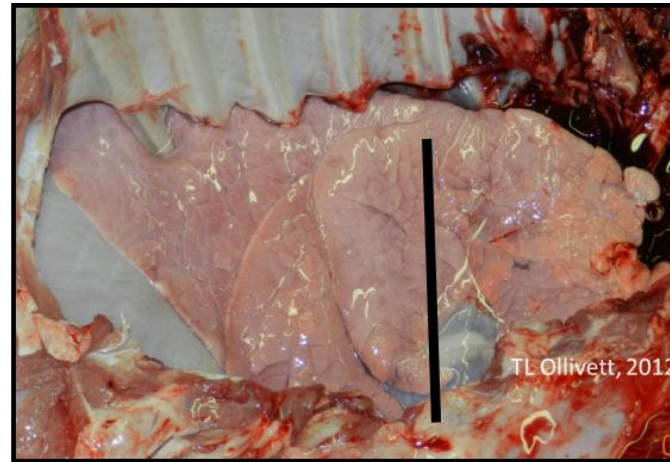
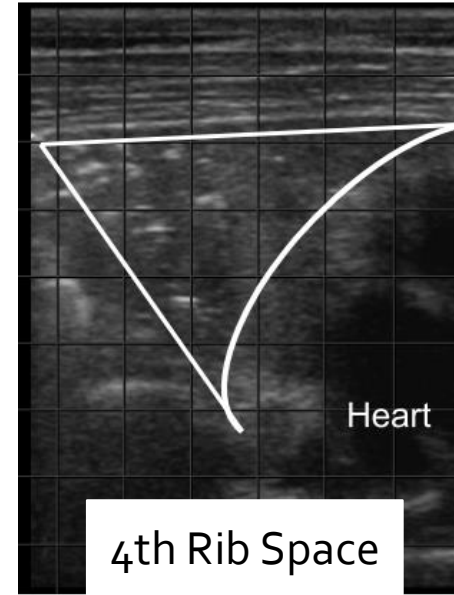
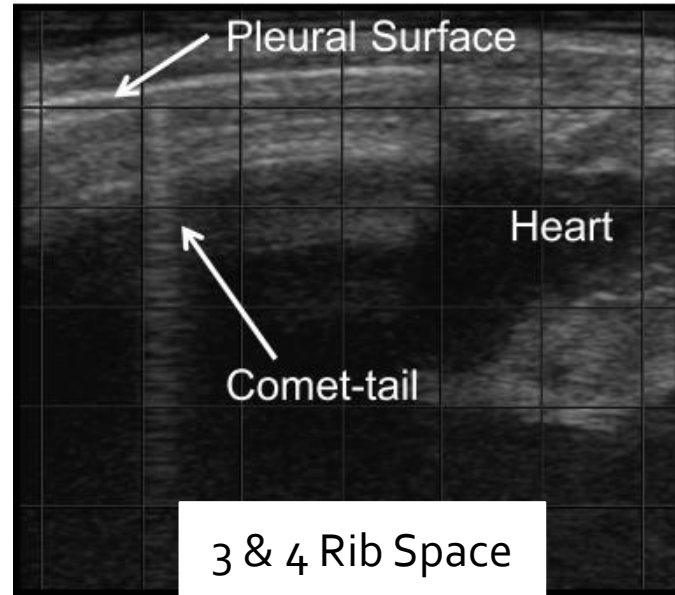


Lung Scan Anatomy

- Healthy Lung
- Unhealthy Lung



Tissue and Lung Scan Comparison

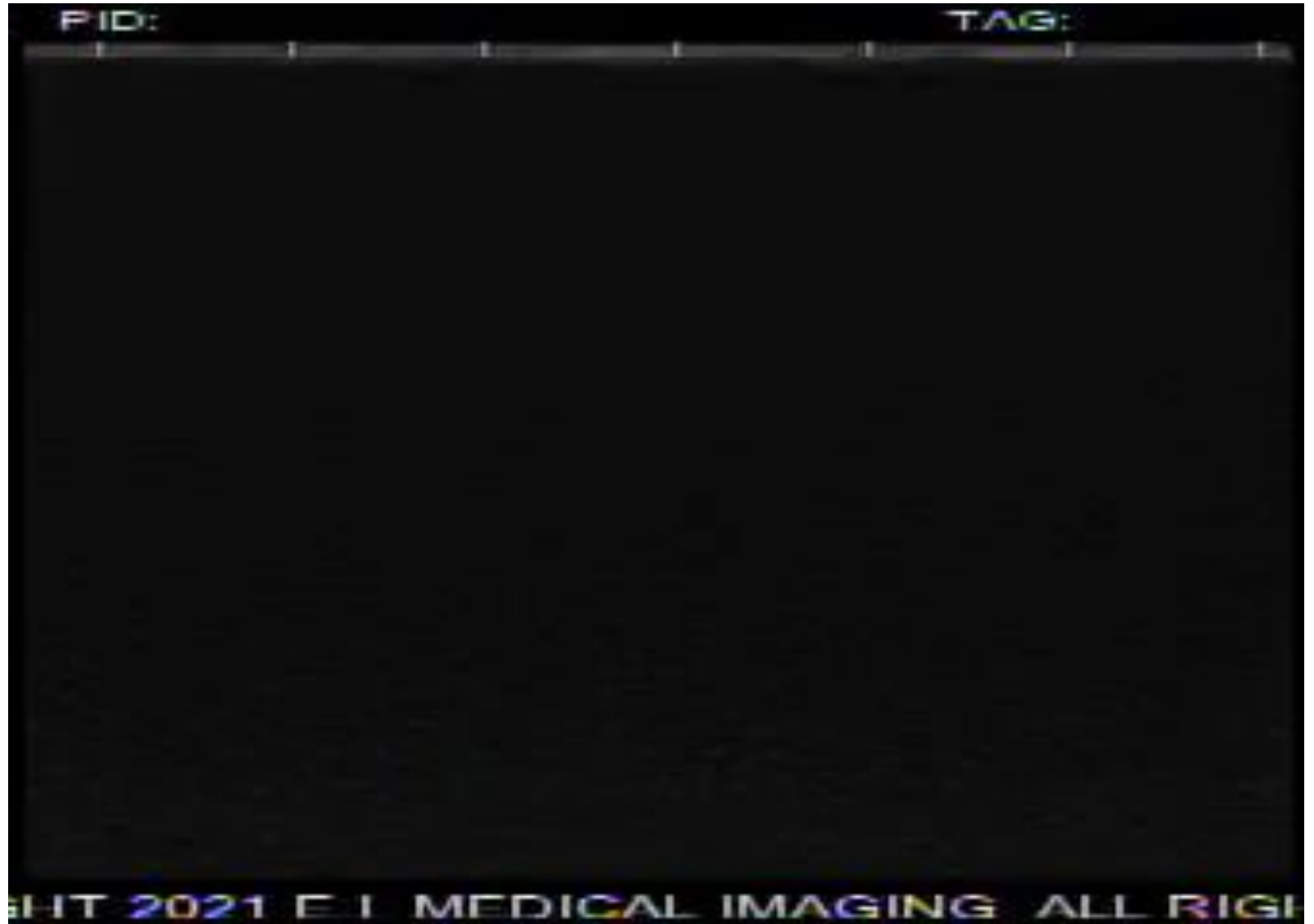


Pictures from
(Ollivett, 2019)

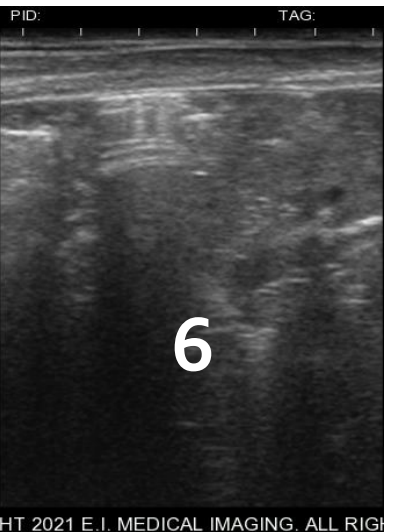
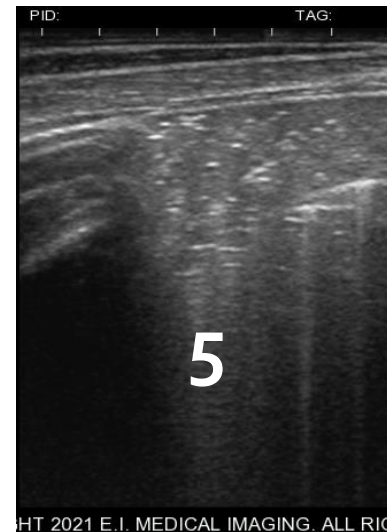
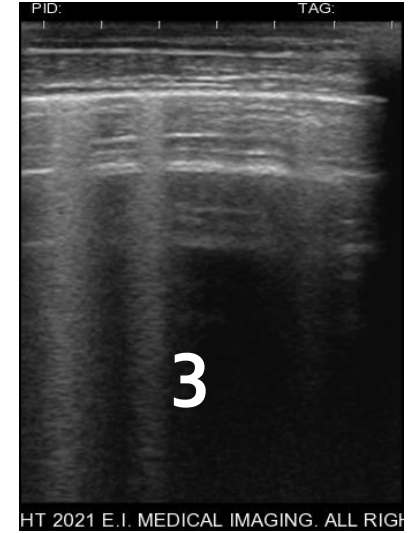
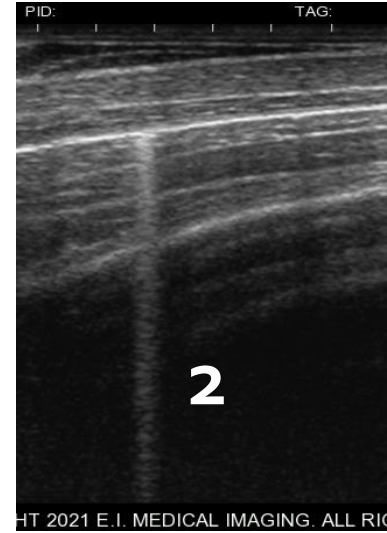
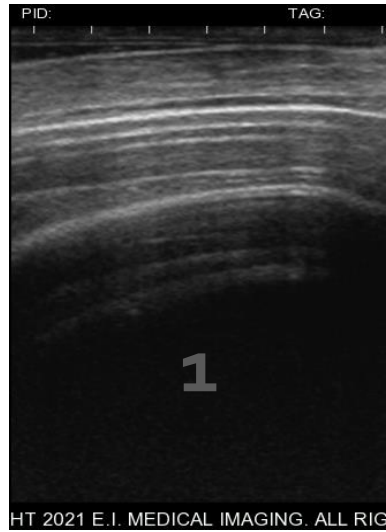
Healthy Lung Scan



Unhealthy Lung Scan



Lung Scanning Scoring System





Implications of Lung Damage in Calves

Lung Scanning in a Group Housing System

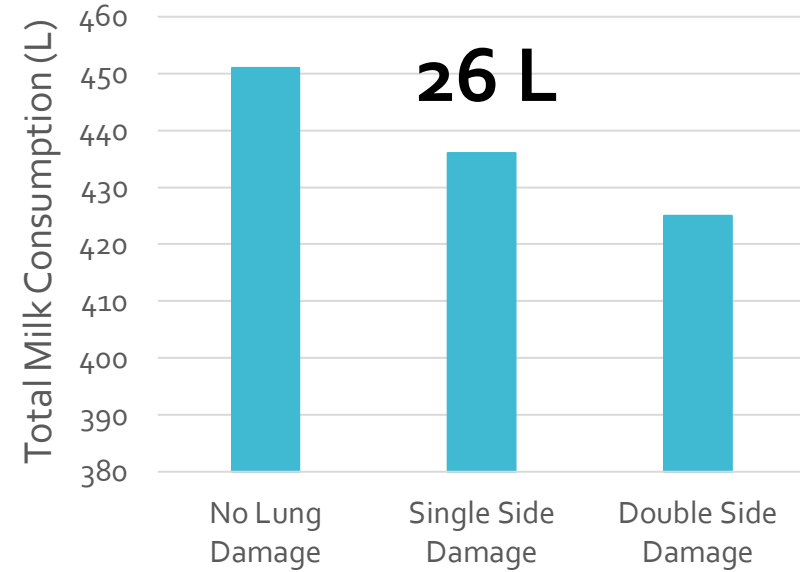
- Weaned calves (64 d of age; n=420) from a commercial dairy
- Automated calf feeder (48-55 calves/pen)
 - 2 feeding stations per pen
- Lung scanning between 48 – 67 days of age
 - No lung damage
 - Single sided lung damage
 - Double sided lung damage

Lung Score	Percentage
No Lung Damage	60%
Single Side Lung Damage	22%
Double Side Lung Damage	18%

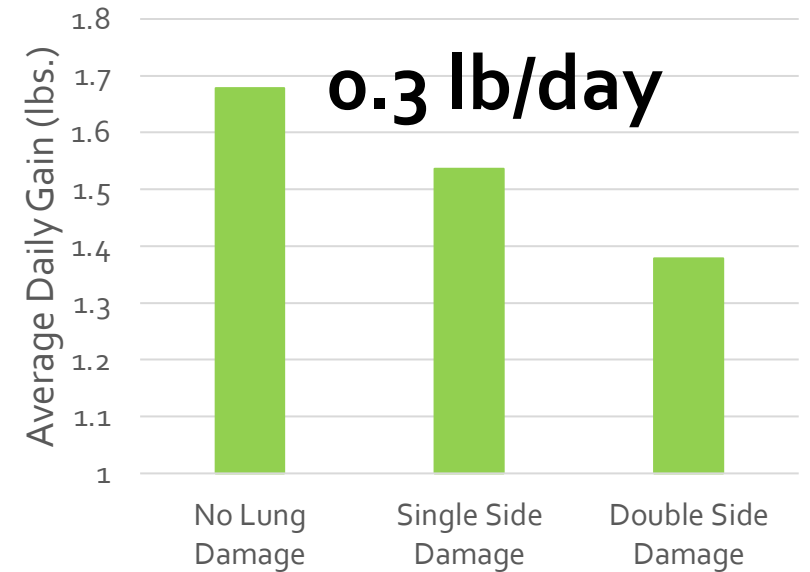
	Antibiotic Treatment	
Lung Damage	+	-
+	36%	4%
-	49%	10%

Lung Scanning in a Group Housing System

Milk Consumption



ADG





Identify the usefulness of lung scanning on commercial farms to improve profitability, production, and sustainability

Calves scanned at different ages on 2 commercial dairies

Weaning Lung Scans

- Weaned calves (n=274) from a commercial dairy

Lung Score	Birthweight (lbs.)	Age (days)	Weight (lbs.)	ADG (lbs./day)	% in Each Score
1	65	96	207	1.66	18%
2	65	92	197	1.58	41%
3	65	95	197	1.44	20%
4	64	91	185	1.37	15%
5	65	87	195	1.68	5%
6	63	102	145	0.79	1%

Lung Damage	5.5 month Weight (lbs.)	ADG (lbs./day)
No Damage	434	1.96
Single Side	399	1.72
Double Side	358	1.59

Lung Scanning at 5.5 months

- Calves heading to the heifer raiser (n=258) from a commercial dairy

Lung Score	Birthweight (lbs.)	Age (days)	Weight (lbs.)	ADG (lbs./day)	% In Each Score
1	95	170	451	2.02	22%
2	91	167	431	1.94	39%
3	96	163	431	1.84	8%
4	96	168	409	1.82	13%
5	97	167	375	1.62	13%
6	99	163	313	1.50	4%

Lung Damage	Birthweight (lbs.)	Age (days)	Weight (lbs.)	ADG (lbs./day)
None	93	168	434	1.96
Single Side	97	167	399	1.72
Double Side	99	166	358	1.59

Comparing Weaning and 5.5 mo. Lung scans

Lung Score at Weaning	Percentage
No Lung Damage	78%
Single Side Lung Damage	15%
Double Side Lung Damage	7%

Lung Score at 5.5 months	Percentage
No Lung Damage	72%
Single Side Lung Damage	16%
Double Side Lung Damage	12%

	Weaning	
5.5 months Lung Damage	+	-
+	5%	21%
-	10%	64%

No relation to time or type of antibiotic treatment pre-weaning on which animals had lung damage



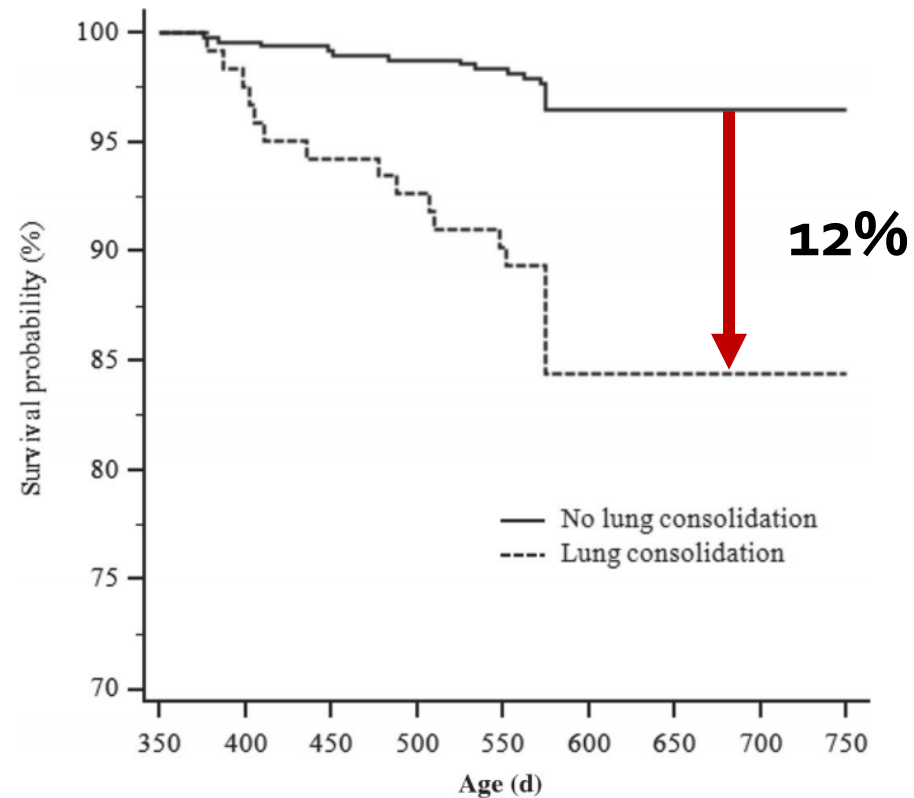
Lung Scans Over Time



The future of Calves Identified with BRD Early in Life

Survival Rate of Heifers to 1st Lactation

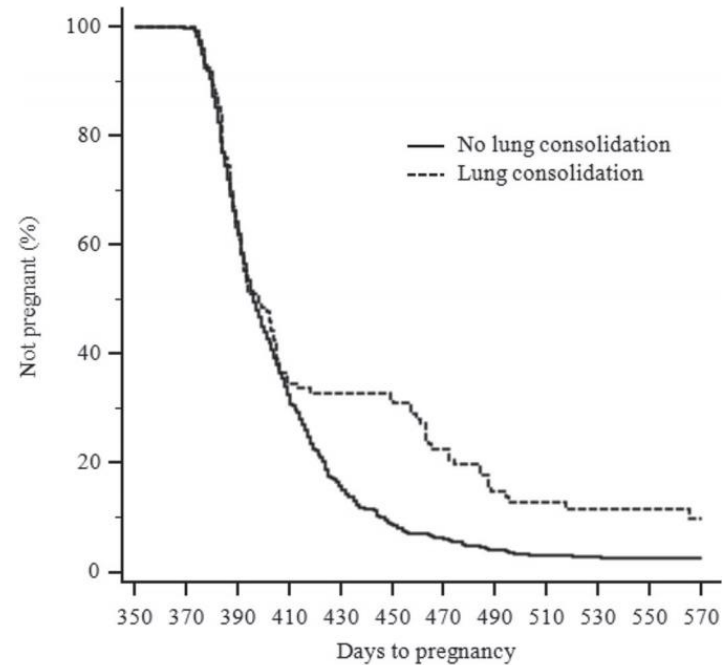
- 18% of heifers culled before first lactation (Schaffer et al., 2016)
 - ~2 to 5 times as likely to be culled before calving if treated for BRD



Teixeira et al., (2017)

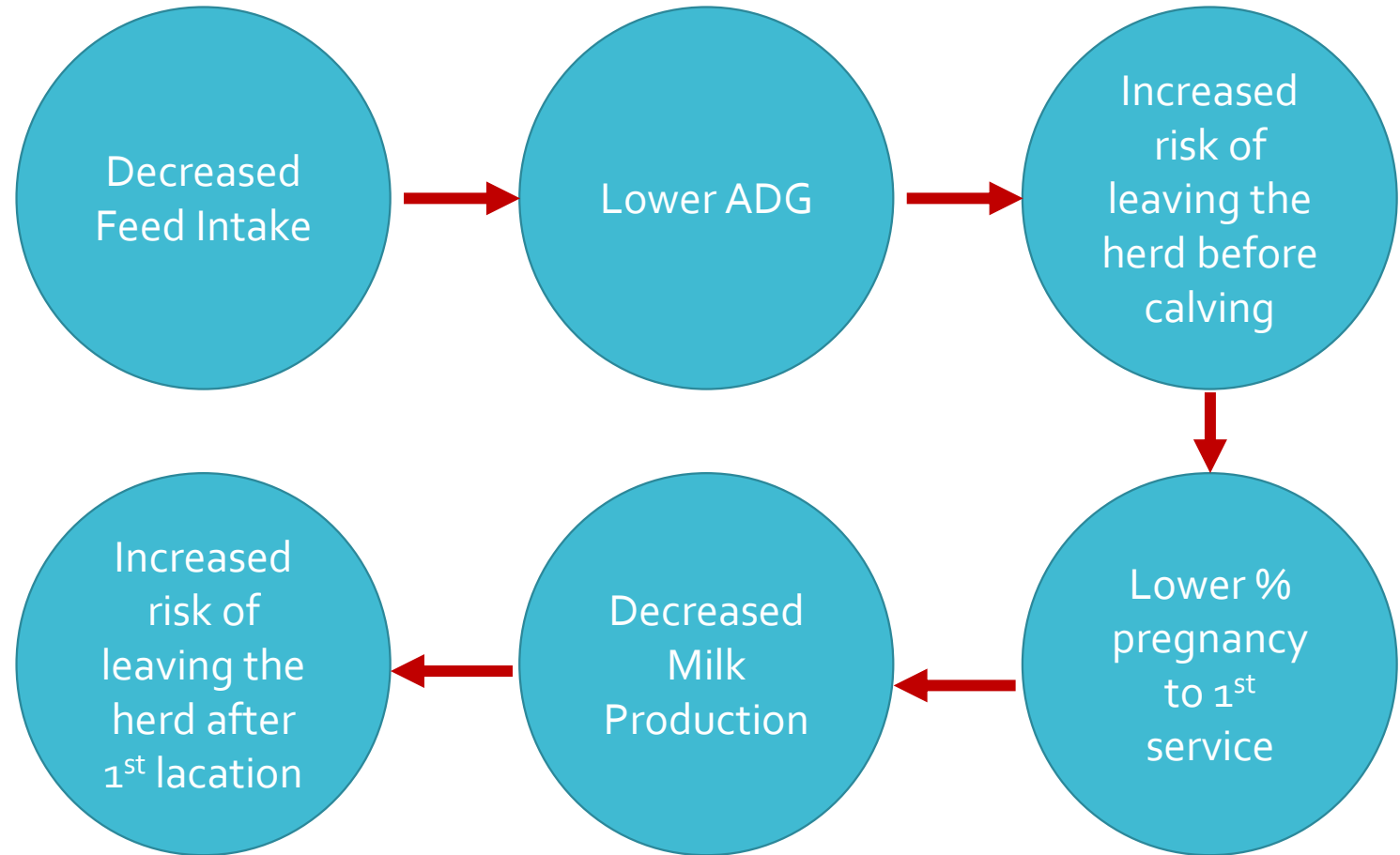
Reduced survival and production

- 17.7% of first lactation cows were culled (Dechow and Goodling, 2008)
 - 1.3 times as likely to be culled during first lactation if treated for BRD
- 9.5% lower pregnancy to first service for calves with lung damage (Teixeira et al., 2017)
- (513 ± 249-lb) lower 305ME first lactation production if treated for BRD (Schaffer et al., 2016)



Teixeira et al., (2017)

Lung Damage Performance Review



Why are we keeping these heifers in our herd?



Change your dairy heifer's career

Lung Status	ADG 10/15/20 to 11/18/20 (lbs./day)	ADG from 9/28/20 to 11/18/20 (lbs./day)
Lung damage prior to arrival	1.80	0.93
Lung damage after arrival	1.39	0.69
No lung damage	1.69	0.93

Where could lung scanning fit on your farm?

- Routine scheduled appointment to scan calves 3-5 weeks of age to identify animals with this disease earlier and administer treatment based off lung score
 - Identify calves with subclinical respiratory disease
 - Reduce the use of antibiotics by not treating false positive animals
 - #WeanClean program (Dr. Ollivett)
 - Identify areas of improvement in your heifer raising program
- Scan calves at weaning to identify those who should be grouped together in the post-weaning phase
- Scan and weigh calves before leaving for a heifer raiser
- Scan calves based on weather patterns
 - If there is an increase in treatment rates scan calves who were born during this time frame

Key takeaways to investigate on your farm

- What is your heifer survivability to first lactation
 - What is your first lactation cull rate
- Does your farm record treatments for BRD in a management software easily viewed?
 - How many have been treated for BRD prior to weaning?
 - How many have been treated for BRD after their first pen grouping?
 - Is there a certain age group your farm treats more often for BRD?
- Does your farm record weight records and could these records be used to help manage your growing heifers?
 - Could your farm group animals based on size and BRD incidence instead of solely on age?
- The rate limiting organ for a dairy heifer up to 1 year of age is the lung! (Dr. Sam Barringer)

Thank You!

- SARE: Sustainable Agriculture Research and Education
- Dairies allowing me to lung scan their calves
- Dr. Jackie Boerman
- Dr. Sam Barringer



Please take
this survey!



Do you want
to lung scan
calves on your
farm?

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