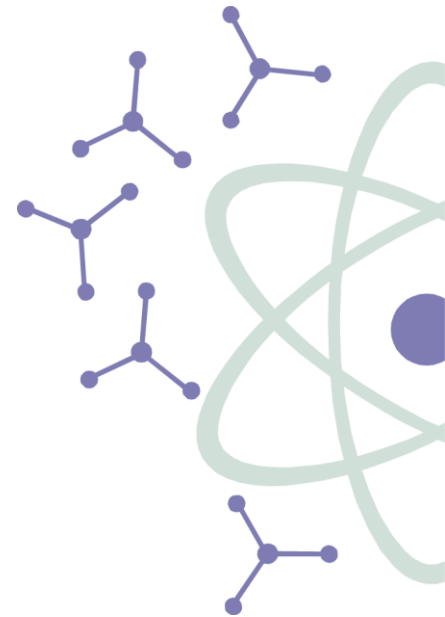


Tail length and bacterial arthritis in lambs: the long and the short of it





Acknowledgements

- Co-authors – David Rutley, Allan Kessell, Idris Barchia, Johann Schröder
- MLA
- Thomas Foods International
- Gerald Martin, and the abattoir meat inspectors and small stock floor personnel who assisted with sample collection
- PIRSA
- Una Ryan and Rongchang Yang



Presentation

- Arthritis in sheep
- Why would tail length matter
- Abattoir survey



Arthritis in sheep

- Bacterial not degenerative
- Bacteria usually enter the body through a break in the skin, reach joints through the blood





Bacteria involved in arthritis in sheep

Enter through breaks in skin

- *Erysipelothrix rhusiopathiae*
- *Streptococcus* spp.
- *Staphylococcus* spp.
- *Escherichia coli*

Transmitted by other routes

- *Chlamydia pecorum*
- *Mycoplasma* spp.
- *Histophilus somni*



Arthritis in Sheep

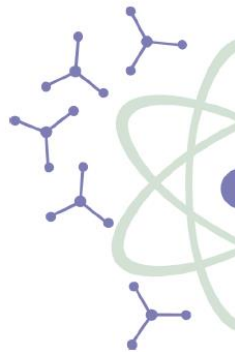
WHY WOULD TAIL LENGTH MATTER



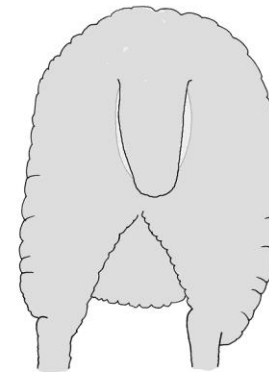
Tail length in unmulesed Australian Merino sheep

Report for Australian Wool Innovation, December 2012

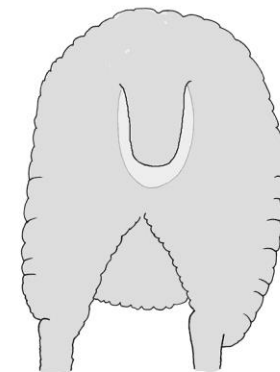
Project Number WP599



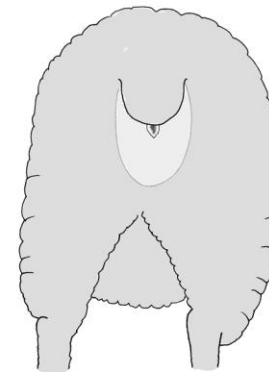
 *Joan Lloyd*
Consulting Pty Ltd



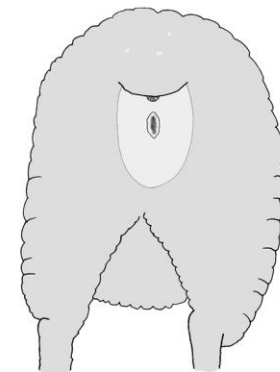
long tail



medium-long tail



medium tail



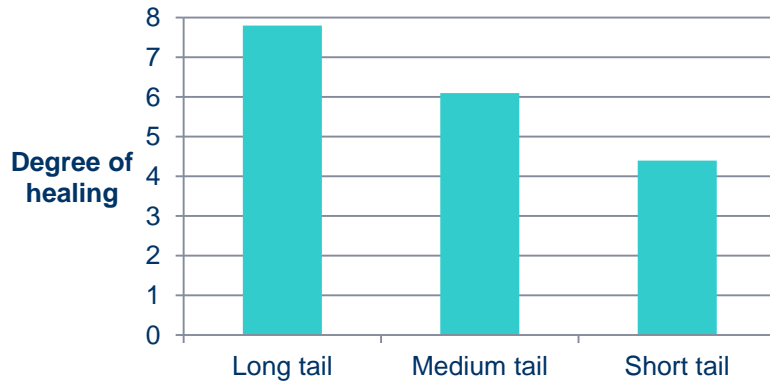
short tail

 *Joan Lloyd*
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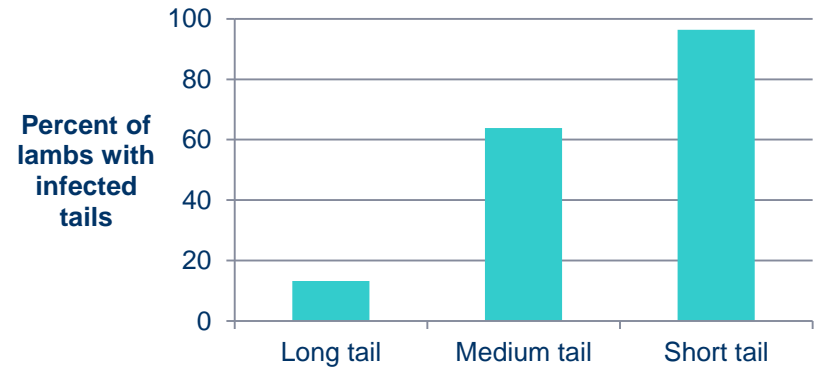


Why would tail length matter?

Healing of tailing wounds 10 days after marking



Rate of infection in tailing wounds 6 days after marking



Source: Johnstone (1944) Aust Vet J 20:286-291



Aim

- To investigate if there is a link between tail length and arthritis in lambs.



Hypothesis

- Short docking leads to infected tailing wounds that take longer to heal, with subsequent haematogenous spread of bacteria to the joints, resulting in arthritis.



Method

- Thomas Foods International, Murray Bridge
 - January 2015
 - March 2015
 - September & October 2015
- Carcasses with arthritis identified and trimmed by DAWR-accredited inspectors



Method (2)

- Tail length by palpation
- Intact, undamaged joints
 - Culture
 - Histopathology
 - PCR for *Chlamydia pecorum*





Method (3)

- Abattoir records – lamb age & breed, lot number, PIC
- PIRSA – key to assign PICs to region



	Number of carcasses examined in total (%)	Number of carcasses selected (%)
Dorper	9,346 (14.8%)	1,601 (8.1%)
Merino	14,300 (22.6%)	5,043 (25.5%)
Crossbred	39,641 (62.6%)	13,160 (66.4%)
Lamb	49,977 (79.0%)	17,339 (87.6%)
Young lamb	13,310 (21.0%)	2,465 (12.4%)

Source: Lloyd et al (2016) Small Rum Res 144:17-22



Prevalence of arthritis in lambs with different tail lengths

Number of coccygeal vertebrae	Per cent arthritis	Standard error	Total carcasses
1 or 2	2.212 ^a	0.101	4,520
3 or more	1.499 ^b	0.065	15,284

Source: Lloyd et al (2016) Small Rum Res 144:17-22



Trim

- $N = 389$
- Average weight 0.747 kg
- Range 0.098-4.448 kg
- 95 per cent confidence interval 0.672-0.822 kg





Bacteria involved in arthritis in sheep

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- *Escherichia coli*

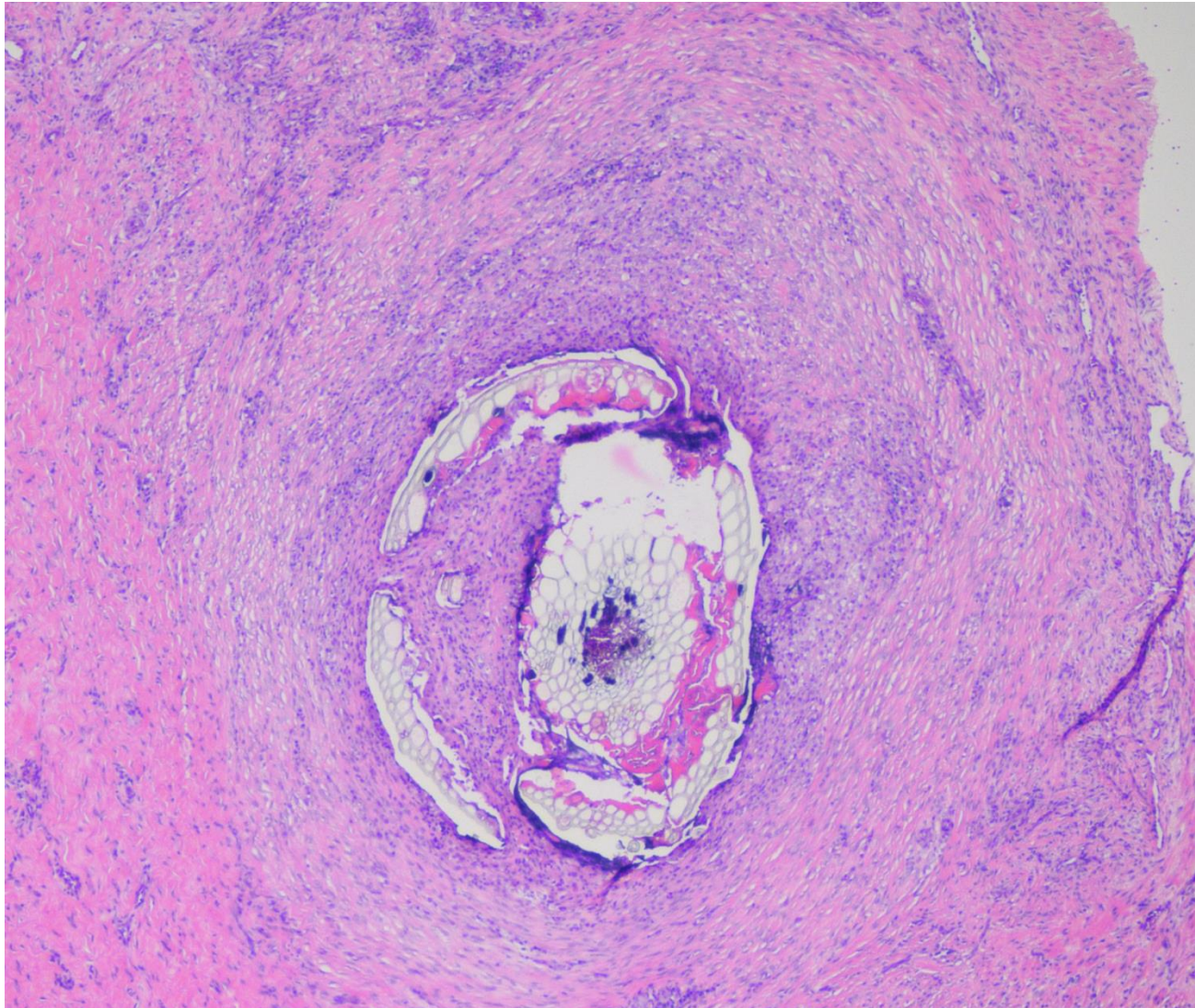
Transmitted by other routes

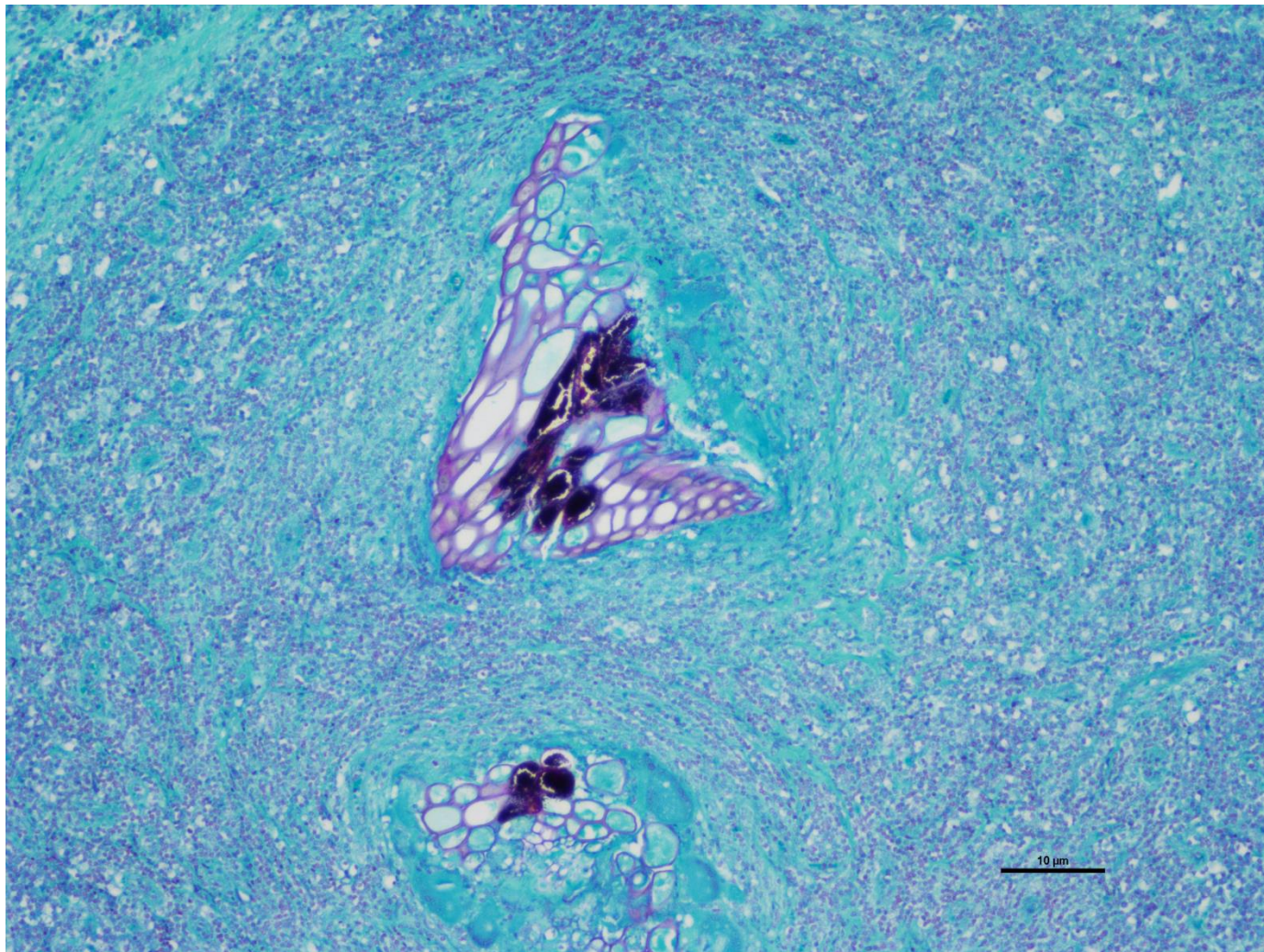
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Bacterial culture

Bacterium	Number of joints			
	November 2014 – January 2015	March 2015	September – October 2015	Total
<u>Pure culture</u>				
<i>Erysipelothrix rhusiopathiae</i>	14	3	9	26
α -Haemolytic <i>Streptococcus</i> spp.	2	-	2	4
<i>Streptococcus</i> spp.	2	1	1	4
Coagulase-negative <i>Staphylococcus</i> spp.	2	-	1	3
<i>S. warneri</i>	-	1	-	1
<i>S. epidermidis</i>	1 ¹	-	2	3
<i>Corynebacterium</i> spp.	1	-	1	2
<i>Micrococcus</i> spp.	1	-	-	1
<i>Cellulomonas/Microbacterium</i>	-	-	1	1
<i>Pasteurella</i> spp.	1	-	-	1
<i>Serratia</i> spp.	1	-	-	1
<i>Serratia liquefaciens</i>	-	2	-	2
<u>Mixed culture</u>				
<i>Erysipelothrix rhusiopathiae</i> , <i>Streptococcus</i> spp.	1	-	-	1
<i>Erysipelothrix rhusiopathiae</i> , <i>Staphylococcus</i> spp.	1	-	-	1
<i>Micrococcus</i> spp. and coagulase negative <i>Staphylococcus</i> spp.	1	-	-	1
<i>Pasteurella</i> spp. and mixed skin flora	1	-	-	1
Bacteriologically positive	29	7	17	53
Bacteriologically negative	59	45	18	122
Bacteriology not done	127	101	18	246







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Chlamydia pecorum

- 148 joints tested
- 10 (6.8%) positive



Other risk factors for arthrits

- 354 consignments of lambs, 63,287 carcasses
- Region - Kangaroo Island, the Murray Mallee, the Mid South East and the Upper South East of South Australia



Other risk factors for arthritis

- 354 consignments of lambs, 63,287 carcasses
- Region - Kangaroo Island, the Murray Mallee, the Mid South East and the Upper South East of South Australia
- Breed – Merino>Crossbred=Dorper



Conclusion

- Docked tail length was identified as a risk factor for bacterial arthritis/polyarthritis in lambs, with shorter tails (one or two coccygeal vertebrae) being a higher risk factor for arthritis/polyarthritis than longer tails (three or more coccygeal vertebrae).
- Region and breed, but not age, were also significant risk factors for arthritis in lambs.
- *Erysipelothrix rhusiopathiae* was re-confirmed as the most common cause of bacterial joint infections in Australian lambs.

