

EFFICACY OF REDUCING SALMONELLA PREVALENCE IN LYMPH NODES FROM INTRADERMALLY INFECTED GOATS BY CARCASS VASCULAR RINSING Koeun Hwang^{*5}, Serhat Al^{1,2}, Robert E. Campbell³, Kathleen Glass⁴, Kurt D. Vogel,⁵, James R. Claus¹

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OBJECTIVES

To determine the ability of carcass vascularly rinsing (Rinse & Chill[®], RC; MPSC Inc., Hudson, WI) to reduce Salmonella prevalence in lymph nodes from intradermally infected goats.

MATERIALS AND METHODS

Animals

• Cull dairy goats (n=20): age 1.5–5 years, live weight 71.2±14.1 kg (IACUC A006428).

Intradermal Injection of Salmonella serotype Enteritidis (SE13)

A commercially available lancet (LT) was dipped into broth containing Salmonella inoculum (6.8x10⁸ CFU/mL) and then applied with light pressure (Fig. 1).

- Each leg (metacarpus and metatarsus): 3-lancet tips (3LT), 13 applications. • Both anatomical sides of the back and belly: 10-lancet tips (10 LT), 1 application.

Treatments

- CN (not vascularly rinsed; n=10).
- Rinse & Chill[®] (RC; 98.5% water; balance: glucose, polyphosphates, maltose; solution temperature, 9°C; applied to each carcass immediately upon exsanguination; n=10).

Carcass Preparation and Lymph Node Processing

- After a 7-day incubation period, the animals were stunned, skinned, eviscerated, and the exterior was sprayed with an antimicrobial spray before being hung in a cooler overnight.
- Prior to excising the lymph nodes, a chlorine bleach solution was applied to the carcass followed by a cold-water rinse. Then, lymph nodes (Table 1) were dissected and trimmed to remove the majority of non-lymphatic tissue.

Dependent Variables

Salmonella enumeration and percentage moisture analysis.

Statistical Analysis

• A 2 x 4 factorial design (treatment x lymph node) was used to statistically analyze the data and trial period served as a covariate in the analysis.

RESULTS

- cervical (4.29 log CFU/g) and mammary (3.68 log CFU/g) lymph nodes.

Panso Vmph Nod **Right/Left** Front Legs

Use ID #	Lymph node name
1	Superficial Cervical
2	Medial Iliac
3	Subiliac
4	Mammary

Table 1. Lymph nodes collected. Fig 1. Intradermal injection sites (black arrows) and location of the collected lymph nodes (n=4). A hypothesis associated with the intradermal delivery of Salmonella to the lymph node was illustrated. (a) Dendritic cells take up Salmonella in the skin and then move to enter a draining lymphatic vessel. (b) Dendritic cells bearing Salmonella enter the lymph node.

Source of non-original illustrations in the Fig. 1:

and present foreign antigens to naive T cells (Parham, 2009).

Salmonella counts in the medial iliac of RC (1.56 log CFU/g) were lower (P<0.05) than in the CN (2.94)</p> log CFU/g). No differences in counts were found among the subiliac (4.39 log CFU/g), superficial

Percentage moisture in the medial iliac of RC (74.4%) was greater (P<0.05) than in the CN (68.7%). No differences were found in the percentage moisture between RC and CN in the other lymph nodes.



Lymph flow and lymph nodes of the sheep (Saar and Getty, 1975; Yen et al., 2019). • Dendritic cells take up antigen in the tissues, migrate to peripheral lymphoid organs,

CONCLUSIONS

- The Salmonella infectivity model was successful by providing sufficient counts in the lymph nodes to assess the rinse solution effects and for future investigation of other antimicrobials included into the Rinse & Chill[®] solution.
- Rinse & Chill[®] was able to demonstrate a 1.3 log reduction in Salmonella but only in the medial iliac lymph node.











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Fig. 2 (a) Salmonella isolates recovered from the goat lymph nodes. Error bars represent standard errors. CN, not vascularly rinsed (n=10); RC, vascularly rinsed with a standard rinse solution (n=10). ^{a,b} Means between carcass chilling treatments with unlike letters are different (P<0.05).

Fig. 2 (a) Salmonella Counts

- A treatment x lymph node effect for counts was found (Least Significant) **Difference**, **1.01 log CFU/g**; **P<0.05)**. TRT main effect on Salmonella counts was not significant (P=0.19; CN=3.82, RC=3.48, $\log CFU/g$).
- RC reduced (P<0.05) the Salmonella counts in the medial iliac by 1.3 log</p> CFU/g compared to CN.

Perhaps the greater moisture content in the RC medial iliac suggests that more of the rinse solution reached this lymph node and therefore exposed it to more of the phosphates which are known to have antimicrobial activity.

Lymph Node

No differences (P>0.05) were found in the percentage moisture between CN and RC in the other lymph nodes.

Fig 2 (b) Moisture Contents

Percentage moisture in the medial iliac of RC was approximately 6% greater (P<0.05) than in the CN.



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SALMONELLA INFECTIVITY MODEL



Fig. 3. Salmonella was intradermally administered to the goats based on the patents (Loneragan and Edrington, 2014, Loneragan et al., 2018) with minor modifications. (a) 3LT, (b) 10LT, (c) Left rear leg with the 3LT, (d) Belly with the 10LT, and (e) Back with the 10LT. The 3LT was used to negate the curvature of the bone.

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