

Project Title:	Determination of <i>Salmonella</i> Lymph Node Contamination of Colonized and Naïve Cattle Post-Comingling, During the Summer in a <i>Salmonella</i> -endemic Feedlot
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Background

In spite of substantial efforts and investments, *Salmonella* harbored in cattle lymph nodes continues to present a major challenge to the beef industry. Researchers continue attempts to identify pre-harvest interventions that are effective against *Salmonella*. However, until a clear route of infection is identified, pre-harvest interventions are somewhat futile. Recent studies have shown a regional effect, where *Salmonella* appears to be more common and present in higher numbers in cattle environments found in the Southern United States. The cause of this regional effect is unknown at this time. It has been hypothesized it may simply be a function of temperature. However, recent findings have challenged that hypothesis. Preliminary data was collected for an investigation where a group of cattle, that had limited *Salmonella* exposure, if any, were transferred to a feedlot known to harbor *Salmonella*. In that study, the cattle were found to shed *Salmonella* in their feces, and all animals carried *Salmonella* on their hides. However, at slaughter, *Salmonella* was not found in the lymph nodes of any of the cattle sampled. While preliminary, these data suggested that management practices and exposures occurring prior to placement in the feedlot may affect lymph node colonization.

The objective of this experiment was to determine the prevalence and levels of *Salmonella* in lymph nodes of naïve cattle and an equal number of cohort animals when comingled in a feedlot that harbors *Salmonella*.

Methodology

Feeder cattle (70 head termed naïve for this study) were transferred from a BIFSCo Region 5 feedlot to a BIFSCo Region 3 feedlot (Figure 1). Detection of *Salmonella* in the Region 5 feedlot has been rare despite in-depth sampling over several years. Conversely, *Salmonella* has been commonly found in the Region 3 feedlot in several recent surveys. The cattle from the Region 5 feedlot were termed “naïve” as they would have had little, if any, interaction with *Salmonella* based on previous studies. Following transfer to the Region 3 feedlot, the naïve cattle were maintained as a lot until re-implant when they were comingled with cohort cattle upon sorting into three different groups based on weight. The cohort cattle came from Region 7. Sorted cattle remained in their designated pens until load out for slaughter.

Fecal and hide swabs were collected at the Region 5 feedlot for all animals to be shipped. Sampling occurred prior to shipping. Fecal swabs and hide swabs were collected again from the naïve cattle one day after arrival at the Region 3 feedlot, which was one week after the exit samples were collected. Fecal swabs and hide swabs were collected from the naïve cattle and an equal number of cohorts at sorting during re-implant. At slaughter,

fecal swabs and both sub-iliac lymph nodes were collected from the naïve cattle and an equal number of cohorts (Figure 2). For twelve head from each of the naïve and cohort groups, an addition four lymph nodes (two superficial cervical and two popliteal lymph nodes) were collected from each carcass. All samples were analyzed for *Salmonella* concentrations and prevalence.

Findings

The prevalence for carcasses with at least one lymph node positive was not different between naïve and cohort groups (Table 1). The results of this study show that naïve cattle are susceptible to lymph node colonization by *Salmonella*. However, the prevalence of animals with lymph nodes colonized by *Salmonella* was quite a bit lower than what has been observed in other studies from this feed yard despite having similar hide and fecal prevalence of *Salmonella*. The low prevalence observed in the current study could be due to harvesting these cattle in November and December, when lower temperatures may have caused a decrease in the environmental *Salmonella* load. Alternatively, it is possible that not being exposed to *Salmonella* early in life may have predisposed the naïve cattle to see *Salmonella* as foreign and be more resistant to lymph node colonization.

This study also showed that *Salmonella* prevalence in feces and especially on hides can undergo dramatic shifts in very short periods of time due to the environmental presence of *Salmonella*. *Salmonella* prevalence on the cattle hides rose from 1.4% to 97.1% with only 24 hours exposure to a high *Salmonella* environment. In addition, 96% (67 of 70) naïve cattle at re-implant had enumerable concentrations on their hides, which averaged 3.6 log CFU of *Salmonella*/100 cm² (Table 2). These results demonstrate the need to develop pen surface interventions to reduce the environmental exposure to cattle entering a feedlot setting.

Figure 1. BIFSCo monitoring regions.

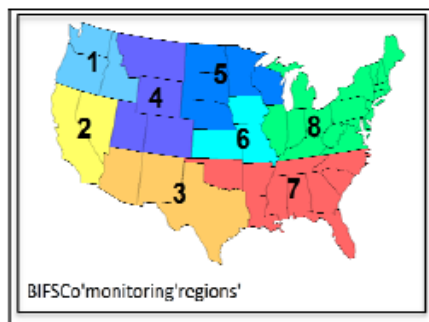


Figure 2. Ruminant lymphatic system anatomy.

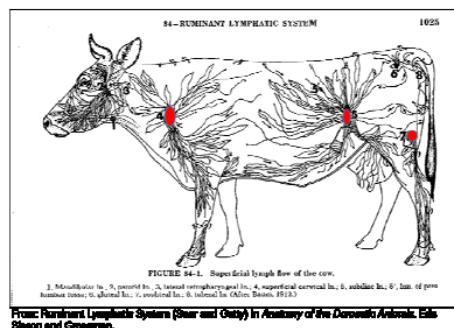


Table 1. *Salmonella* prevalence.

Sample Period	Sample Type	Naïve	Cohort
Load out (May)	Fecal swab	0.0%	-
	Hide swab	1.4%	-
Incoming (May)	Fecal swab	15.7%	-
	Hide swab	97.1%	-
Re-implant (Sept.)	Fecal swab	75.0%	85.7%
	Hide swab	100%	100%
Harvest (Nov./Dec.)	Fecal swab	63.8%	68.3%
	Lymph node (sub-iliac) ^a	10.6%	15.9%
	Lymph node (any) ^b	14.9%	15.9%

^aPrevalence of carcasses with at least one sub-iliac lymph node containing *Salmonella*.

^bAn additional four lymph nodes (2 superficial cervical and 2 popliteal) were collected from twelve of the naïve and twelve of the cohort carcasses. These data represent the prevalence of carcasses with any lymph node positive for *Salmonella*.

Table 2. Enumeration of *Salmonella* on the hides of naïve cattle.

Sample Period	# of Samples with Enumerable <i>Salmonella</i> Concentrations	Average log of CFU of <i>Salmonella</i> /100 cm ²
Load out	0	NA
Incoming	29	2.5
Reimplant	67	3.5