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Project Title: **Prevalence, Identification, and Drug Resistance of *Salmonella* Serovars from Texas Beef Cattle Feedlots**

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Objective: The asymptomatic carriage of *Salmonella* serovars, particularly antimicrobial resistant salmonellae, in cattle at harvest may compromise the safety of fresh beef. The objectives of this research were to: i) identify the presence of *Salmonella* Newport and other *Salmonella* serovars from Texas feedlots, and; ii) characterize recovered salmonellae for their resistance to antimicrobials.

Experimental Design & Analysis:

Three feedlots in south Texas previously characterized for *Salmonella enterica* prevalence were visited and samples (n=108) collected from dropped feces, feed, drinking water, and soil in cattle pens. Pre-enrichment, selective enrichment and selective/differential isolation of *Salmonella* from samples were developed in consultation with Tom Edrington, Ph.D. (USDA-Agricultural Research Service, College Station, TX). Following pre-enrichment in lactose broth, salmonellae were selectively enriched in Rappaport-Vassiliadis (RV) broth. Sterile inoculating loops were used to capture and streak 0.1 ml aliquots from enriched RV culture fluid onto surfaces of xylose lysine desoxycholate agar-containing Petri dishes, incubated at 35°C for 24-36 hr. A representative subset of presumptive *Salmonella* isolates was prepared for biochemical identification by the Vitek® 2 system (bioMérieux N.A., Durham, NC), serotyping via xMAP *Salmonella* Serotyping Assay (Luminex Corp., Austin, TX), and antimicrobial drug resistance screening using the Sensititre™ Complete Automated System (Thermo Fisher Scientific, Inc., Waltham, MA). Nucleic acid amplification-based detection was used for the confirmatory identification of presumptive *Salmonella* colonies via the Atlas® System (Roka Bioscience, Inc., San Diego). All *Salmonella* identification, typing, and drug resistance analyses were completed according to instructions provided by the assay manufacturer.

Key Results:

Salmonella were identified from 20/108 samples (18.5%) by biochemical and/or serological testing. Comparative testing between biochemical and molecular methods yielded only one disagreement, where molecular detection failed to confirm *Salmonella* presence from pre-enrichment medium. From amongst all sample types, 85.0% of salmonellae were collected from feedlot 1000, with the remainder from feedlot 2000. Soils accounted for 60% of *Salmonella*-positive samples, with 100% of feedlot 1000 soil samples bearing salmonellae. *Salmonella* were recovered from 10% of feed samples, 10% of dropped feces samples, and 20% of drinking water samples, all from feedlot 1000. From a set of 38

isolates representative of *Salmonella*-positive samples subjected to serotyping, *S.* Anatum was recovered from all sample types, though only from feedlot 1000. Feedlot 1000 also harbored *S.* Muenchen, Altona, Kralingen, and Kentucky. *Salmonella* Montevideo was recovered from feedlot 1000 (feces) and 2000 (soil). Antimicrobial resistance was variable amongst *Salmonella* isolates; 78.9% of isolates were resistant to 8.0 µg/ml streptomycin, while the remaining eight isolates bore intermediate resistance to the drug at 4.0 µg/ml. 7.9% of *Salmonella* isolates were resistant to >256 µg/ml sulfisoxazole; one isolate (2.6%) bore intermediate resistance at 8.0 µg/ml gentamicin.

Industry Application:

Identification of serotypes and antimicrobial resistance of feedlot-prevailing salmonellae may be applied to the development of systems describing the distribution and tracking of *Salmonella* throughout the beef chain. In addition, this study was conducted in conjunction with research determining the prevalence of *Salmonella*-infective bacteriophages, a pre-harvest antimicrobial intervention that has been successfully applied to reduce numbers of foodborne pathogens on beef cattle prior to harvest.

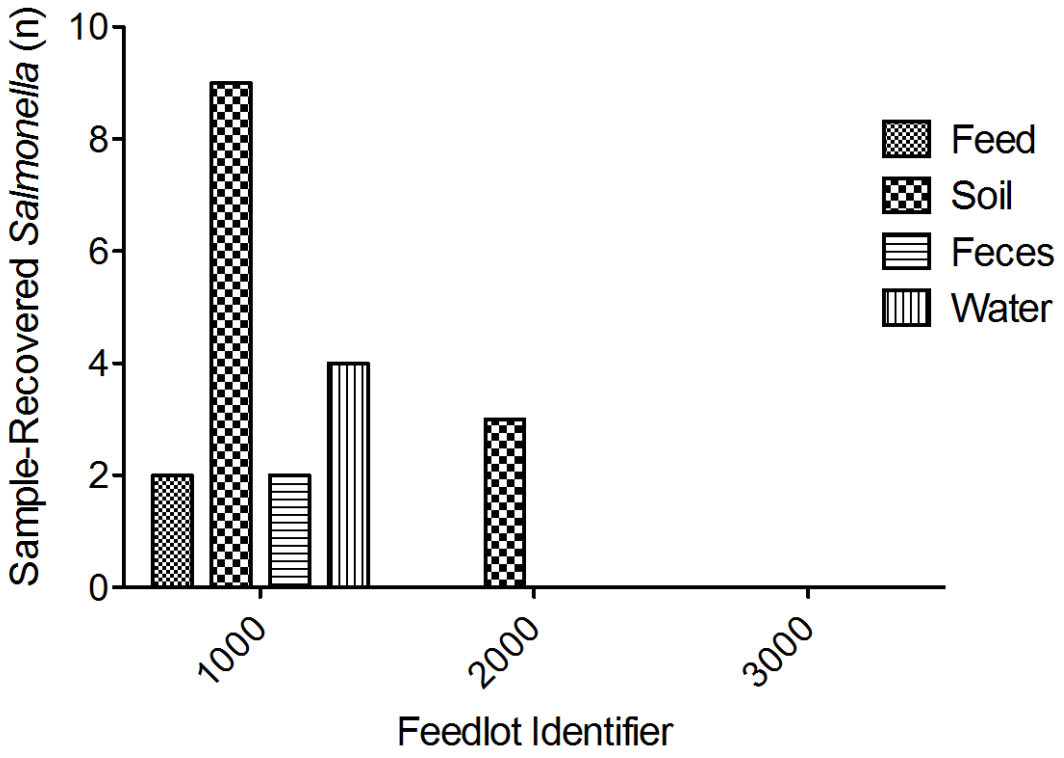

Figure: Recovery of *Salmonella enterica* from south Texas cattle feedlots by feedlot and sample type (bunk-retrieved feed, pen soil, dropped feces, drinking water from troughs).