

## CORRELATION OF ENVIRONMENTAL TEMPERATURE, PRECIPITATION, AND HUMIDITY WITH SALMONELLA CULTURE RESULTS FROM CATTLE IN VIRGINIA, USA

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*The relationship between weather parameters and the diagnosis of bovine salmonellosis at four Virginia, USA regional diagnostic laboratories was investigated. Significant Spearman's correlation coefficients were found between the monthly average temperature, the monthly average relative humidity and the monthly percentage of positive samples at two laboratories. The correlation coefficients were positive in one laboratory ( $r_s=0.34$ ,  $P=0.01$  and  $r_s=0.39$ ,  $P=0.002$ , for the temperature and relative humidity, respectively). The other laboratory had negative correlation coefficients ( $r_s=-0.38$ ,  $P=0.03$  and  $r_s=-0.41$ ,  $P=0.02$ ). The inconsistent direction of the correlation coefficients may be related to different types of cattle operations and seasonal calving patterns in the regions served by the two laboratories.*

The objective of this study was to investigate the correlation of the laboratory diagnosis of bovine salmonellosis with weather conditions. The weather parameters considered were monthly average temperature, total precipitation, and average relative humidity. The number of bovine samples submitted for salmonella culture and the number of samples with positive salmonella culture results were determined using records from four Regional Diagnostic Laboratories of the Virginia Department of Agriculture and Consumer Services. The data were from a period of five years (1990-1994) in one laboratory and three years in the other three laboratories (one from 1992, 1994-1995 and two from 1993-1995). The relationships of weather parameters with the monthly number of salmonella culture positive samples and the percentage of positive samples were evaluated for each laboratory using Spearman's rank correlation.

*S. typhimurium* was the serotype most commonly identified during the study period (75% of isolates). For the laboratory located in the most concentrated livestock production region of the state, the annual number of samples cultured and the percentage positive for salmonella ranged from 106 to 204 and 10.6% to 30.4%, respectively. The highest correlation coefficients for this laboratory were found between the monthly percentage of positive samples and the average temperature of the previous month ( $r_s=0.34$ ,  $P=0.01$ ) and the average relative humidity in the same month ( $r_s=0.39$ ,  $P=0.002$ ). In contrast, temperature and humidity in the same month were inversely related to the percentage positive samples at another laboratory ( $r_s=-0.38$ ,  $P=0.03$  and  $r_s=-0.41$ ,  $P=0.02$ , respectively) and were not significantly correlated with the percentage positive salmonella cultures for the other two diagnostic laboratories. Precipitation was not significantly correlated with salmonella culture results for any of the four regions. The results for correlation with the monthly total number of positive salmonella cultures were similar to those for the percentage positive samples.

These findings suggest that bovine salmonellosis was more common during hot, humid weather in the region of Virginia with the most intensive livestock production. This was consistent with a U. S. Department of Agriculture study which found a higher prevalence of fecal shedding of salmonella by dairy calves in summer months (USDA, 1994). The discrepancy in the direction of the correlation coefficients obtained for different laboratories in this study needs further investigation. This inconsistency may be related to the types of cattle operations in the regions served by the laboratories. The laboratory located in an area where dairy cattle are more common and where cattle and poultry operations are found in close proximity showed positive correlation coefficients for the salmonella positive percentage with the temperature and relative humidity. The laboratory with more positive salmonella cultures during times with cooler weather and lower relative humidity is located in a region where beef cattle predominate. Calving patterns for dairy and beef cattle in the study region differ with the majority of beef cows calving in the late winter or spring (when temperature and humidity are relatively low) and a tendency for the number of dairy cows calving to increase in late summer. Cows near parturition and neonatal calves are more susceptible to clinical salmonellosis than other cattle (McDonough, 1995). Therefore, differences in cattle populations and calving patterns may in part account for the inconsistent results between laboratories.

### BIBLIOGRAPHY

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