# Spatial Analysis of Bulk Tank Milk Somatic Cell Counts from Dairy Herds Located in Southeast Region of Brazil, 2011

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## Introduction

Differences such as climatic and landscape conditions, agricultural activities, local health animal policy and cow racial heterogeneity have a great influence on mastitis spread and control (1). Geographical spatial analysis of mastitis prevalence is an important and available tool to explore spatial patterns and cluster detection of bovine udder health. These data are of interest for dairy plant and government policies since it provide useful information for decision-making at region levels (2). Since high somatic cells counts is an indicative sign of mastitis the aim of this study was to identify areas with high bulk tank somatic cell counts (BTSCC) from dairy herds located in Southeast Region of Brazil.

## Material and Methods

Information about geographical coordinates and annual geometric mean of BTSCC from 860 dairy herds located at Espírito Santo State, Brazil southeast region, was collected. The area considered for this study was 3,633 $km^2$. The spatial dependence for BTSCC was evaluated using semivariogram. In case of spatial dependence, the values of BTSCC at non-sampled locations were estimated with minimum bias and variance by Kriging method for interpolation data. The exponential model was used to adjust the semivariogram. Determination coefficient ($R^2$) and spatial dependence degree (SDD) were calculated in function of exponential model parameters.

## Result and Discussion

The results demonstrated a moderate spatial dependence (SDD=28.9 and $R^2$=0.308) at the evaluated area. The spatial analysis showed areas with low (less than 250,000 cells/mL), medium (between 250,000 and 400,000 cells/mL) and high (more than 400,000 cells/mL) BTSCC (Figure 1). Areas located at south and southwest probably had greater number of herds per square kilometer in relation the areas located at central and northeast of evaluated region (Figure 1). Taken together these results suggest that mastitis may be more prevalent at central and northeast of evaluated region for an intervention priority in local udder health policies. The geographical distribution of dairy herds is also important information for epidemiological control of another infection diseases at Brazil Southeast Region since high animal density may increase the risk for infection propagation among dairy herds. The geographical distribution of dairy herds at national

territory and interpolation of other important data such as milk quality indicators, economic losses and other disease prevalence might constitute an essential tool for a more efficient intervention in public and animal health policies.
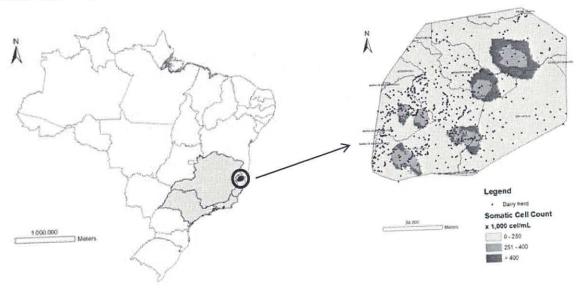


Figure 1. Map of Brazil and its Southeast Region (left map, gray scale). Map of evaluated area with dairy herds location and clusters of low, medium and high bulk tank somatic cell counts (right map).

## Conclusion

The map of BTSCC might be useful for a decision-making police at regional level for mastitis control by government and private dairy sector located at evaluated area.

## Acknowledgements

## References

1. Ely, L.O., J.W. Smith, and G.H. Oleggini. 2003. Regional production differences. J. Dairy Sci. 86:E28.

2. Gay, E., R. Senoussi, and J. Barnouin. 2007. A spatial hazard model for cluster detection on continuous indicators of disease: application to somatic cell score. Vet. Res. 38:585.

3. Halasa, T., K. Huijps, O. Osteras, and H. Hogeveen. 2007. Economic effects of bovine mastitis management: A review. Vet. Quart. 29:18.