

MILK QUALITY MEASURES AND THE RISK OF ANTIBIOTIC RESIDUES IN GRADE A MILK

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Introduction: The bulk tank somatic cell count (SCC) is a measure of the prevalence of intramammary infection (mastitis) in a dairy herd. The standard plate count (SPC) is a measure of the bacteria present in milk. Research conducted in the UK suggests SPC is highly correlated with SCC. Antibiotic therapy is commonly used in dairy cattle to treat clinical or subclinical mastitis. Thus, high bulk tank SCC or SPC may be risk factors for antibiotic residues in milk. The purpose of this study was to determine if bulk tank standard bacterial plate count or plate loop count and bulk tank somatic cell count are associated with the risk of violative antibiotic residues in milk.

Materials & Methods

Data were retrospectively collected from a cross section of dairies that belong to a large milk marketing cooperative in the Northeast and Midwest U.S., as well as data from all dairies involved in the Ohio Department of Agriculture Grade A Milk Inspection Program. Milk cooperative data were derived from 6,546 farms which contributed 16,831 herd-year observations. Ohio Department of Agriculture data were derived from 4,022 farms which contributed 12,042 herd-year observations. The years represented in both data sets included test results from January 1, 1994 to December 31, 1997.

Variables were screened using logistic regression for their association with the risk of an antibiotic residue violation. Variables that were associated with the risk of an antibiotic residue violation were subsequently analyzed using multivariable logistic regression models. Generalized estimating equations were used to account for homogeneity of variance.

Results

The cooperative data yielded 131 antibiotic residue violations after exclusion of incomplete herd-years. This resulted in 7.8 violations per 1,000 complete herd-years. In contrast, the ODA data had 482 independent antibiotic residue violations for a rate of 40 violations per 1000 complete herd-years. One reason for this difference can be explained by the fact that the cooperative only tested for residues under Section 6 of the PMO whereas ODA tested according to both Section 6 and Appendix N. Somatic cell count appears to be a risk factor for antibiotic residue violations in milk. As the mean annual somatic cell count increased, the risk for an antibiotic residue violation also increased. In the cooperative data, compared to the lowest SCC category (<400,000 cells/ml; OR=1.0), the risk of an antibiotic residue in the moderate category (400,000

- <750,000 cells/ml) was >2 times higher, and the risk in the highest category (>750,000 cells/ml) was >5 times higher. In the ODA data, the risk in the moderate category was 1.3 times higher than the lowest category (OR=1), and 2.2 times higher in the highest category. Standard plate count or plate loop count was not significantly associated with the risk of antibiotic residue violations.

Discussion

Somatic cell count is clearly associated with the risk of antibiotic residues in milk in what appears to be a dose-response relationship. Exclusion of milk from the proportion of high SCC herds in the milkshed would greatly reduce the risk of antibiotic residue violations. However, in order for farms to conform to lower legal limits, this may initially lead to increases in antibiotic residue violations. An alternative solution may be concentration of information about methods to avoid antibiotic violations in high SCC herds and utilize intervention programs in these herds.