Surveillance capacity and value-chain integration of cattle slaughterhouses in Thailand: implications for risk-based bovine tuberculosis monitoring

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Disease monitoring relies on slaughterhouses to identify zoonotic and production-limiting infections such as bovine tuberculosis at the crossroads of animal health and food safety. In low- and middle-income settings, slaughterhouse surveillance remains one of the most feasible forms of passive surveillance, yet its implementation varies substantially according to local operational realities. In Thailand, national evidence on facility-level surveillance readiness remains limited despite the important role of slaughterhouses in disease detection and reporting. This study evaluated surveillance capacity and value-chain integration among cattle slaughterhouses in Thailand and identified system-level patterns relevant to risk-based bovine tuberculosis surveillance.

A national cross-sectional study was conducted between January and June 2024 in 90 cattle slaughterhouses selected from 462 officially registered facilities using stratified sampling by region and operational scale. Surveillance performance was assessed using a Surveillance Capacity Index (SCI), constructed from four domains: standard operating procedure compliance, documentation quality, reporting channels, and traceability infrastructure. Value-chain integration was measured using a Value Chain Integration Score (VCIS), reflecting supplier diversity, service-user access, and customer diversity. Comparative analyses were performed by operational scale, ownership type, and region.

Across all facilities, the mean SCI was 0.52 ± 0.22 and the mean VCIS was 0.67 ± 0.26. Small-scale slaughterhouses showed the highest surveillance capacity (SCI 0.55 ± 0.23) and the strongest value-chain integration (VCIS 0.76 ± 0.19), while large-scale facilities had the lowest integration (VCIS 0.22 ± 0.21). Private facilities demonstrated significantly stronger surveillance-related performance than public facilities in both SCI and VCIS. Marked regional variation was also observed, with lower surveillance readiness in some regions compared with others. These findings suggest that surveillance readiness is not uniformly distributed across the Thai slaughterhouse network and that structural characteristics influence implementation capacity.

This study provides national-level evidence that slaughterhouse surveillance capacity in Thailand is heterogeneous rather than standardized in practice. A uniform compliance model is therefore unlikely to be optimal. Instead, bovine tuberculosis surveillance policy should move toward a risk-based and context-sensitive approach aligned with operational scale, ownership structure, and value-chain position. Strengthening surveillance in slaughterhouses should focus not only on technical requirements, but also on system design that reflects how facilities actually function within livestock production and marketing networks.

Keywords: bovine tuberculosis, slaughterhouse surveillance, surveillance capacity, value-chain integration, Thailand.

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