

Maintenance of the last step of the cold chain: on-farm refrigerator storage and performance

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Introduction

Failure of the cold chain and thermal damage to refrigerated vaccines can result in losses for cattle owners and safety issues for cattle. The primary objectives of this study were to quantify characteristics of refrigerator operating temperatures on regional dairy and veterinary operations, including the percentage of time that refrigerators spent outside the recommended temperature interval (RTI) of 36°F to 46°F (2°C to 8°C) for vaccine storage, the mean daily temperature range (MDTR), and identify variables associated with those characteristics.

Materials and methods

Twenty refrigerators were selected by convenience from regional dairies and veterinary clinics. Refrigerators were designated as mini, household and commercial. Data loggers with 5 mL glycol bottles and ambient temperature sensors were installed into each refrigerator with temperatures recorded every 10 minutes from July to November 2021. Temperature data were downloaded to online logger software, transferred into spreadsheets and a relational database for statistical analysis.

Results

The percentage of time that refrigerators spent outside the RTI ranged from 0% to 80% with a median of 22%. The percentage of time outside the RTI was significantly greater for household refrigerators (37%) compared to commercial refrigerators (2.2%), while mini-refrigerators (27%) were intermediate. The estimated MDTR of household refrigerators (9.5°F, 5.3°C) was also significantly greater than that of commercial (5.4°F, 3°C) or mini (5.8°F, 3.2°C) refrigerators.

Significance

Type of refrigerator was significantly associated with temperature control, with commercial refrigerators performing the best. Temperature excursions occur frequently in household and mini refrigerators. Implications show the necessity for proper temperature monitoring, staff training and record keeping.

