

University of Prince Edward Island

Faculty of Veterinary Medicine
Summary of Dissertation

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Determinants and improvements of calf welfare status on smallholder dairy farms in Kenya

A total of 187 heifer calves on 150 primarily zero-grazing smallholder dairy farms had up to six bimonthly farm visits to collect animal- and farm-level data. A prospective cohort study determined the frequency and factors associated with time-to-onset and fecal counts of strongyle-type eggs and coccidia oocysts. A randomized controlled trial evaluated the intervention effects of improvements in calf housing structures (e.g. roof leaks and floor comfort) and management (e.g. hygiene and feed) on average daily gain (ADG) and lying behavior. Partial budget analysis was used to determine the economic effects of implementing the housing enhancements and management changes.

For the 28.3% and 87.7%, of calves infected with strongyles and coccidia, median time-to-onset was 78 and 43 days, respectively. Final Cox proportional hazard models and mixed-effects negative binomial models demonstrated that management factors, such as weaning status, tethering, floor elevation and pen hygiene, play a role in the burden and time-to-onset of coccidia and strongyle-type oocyst/egg shedding. The final linear regression model demonstrated that the intervention increased ADG (mean: 0.487 kg/d) by 5.6% during the post-weaning period. In the final mixed-effects linear regression model on daily lying time (means over the 6 visits included 12.6-16.9 hr/d), use of wood shaving/sawdust/crop waste for bedding had a positive association, while use of a rubber mat alone had a negative association. Partial budget analysis showed that the net financial return of undertaking the housing and management improvements was positive at USD 65.94 per heifer, primarily based on having a larger heifer at 15 months, reduced bedding and medical care costs, and lower risk of death.

In conclusion, management and housing improvements had positive associations with time-to-onset of parasitic infection and egg/oocyst counts, ADG and lying behavior in heifer calves on smallholder dairy farms, and therefore improved their economic and animal welfare outcomes.