

Effects of a bacterial and enzymatic product on physical and chemical properties of bedding and cow behaviour in compost bedded pack barns

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Compost bedded pack barns (CBPB) are increasingly used to house dairy cows. These are loose housing facilities where an organic bedding base is mixed regularly to remove faeces and urine from the bedding surface and oxygenate the pack. These facilities face challenges in maintaining low bedding moisture to ensure cow comfort and good udder health. This study aims to evaluate a bacterial and enzymatic treatment in assisting with the management of CBPB and to gain an improved understanding of CBPB management. A 5-week multisite replicated exposure study was conducted to assess the impacts of treatment with a bacterial and enzymatic product and pack management on pack measures and cow behaviour, on 5 commercial CBPBs in Australia from late autumn to early spring in 2023 and 2024. The packs were randomly divided into alternating control ($n = 20$) and treatment ($n = 20$) areas for a total of 40 areas. Barn characteristics were recorded on day 1. Packs had 1 baseline week monitored before the treatment was applied at the start of weeks 2 and 4.

Compost temperature ($^{\circ}\text{C}$), stocking rate per study area ($\log \text{m}^2/\text{cow}$), and aerial ammonia concentrations (ppm) were assessed as outcome variables every 2 ± 1 d across all 5 farms. Three farms had compost moisture percentage and carbon to nitrogen ratio (C:N) assessed weekly. Local weather conditions were measured daily for all 5 farms, while the cultivation rate of the pack (m^2/min) was recorded for 3 farms. Multilevel mixed models were used to analyse the effects of treatment, covariables, and the interaction of treatment over time. There was no effect of treatment on the measured outcomes, suggesting the treatment was not exerting a significant impact on bedding quality. Aerial ammonia concentrations could not be analysed as ammonia was only detected on 6 days. The minimal ammonia detection is a positive finding for human and cattle health. Management factors that improved bedding quality included decreased stocking rates and slowing the cultivation rate. The addition of this treatment did not improve pack performance in the studied CBPB.

Keywords: Compost bedded pack barns, cow comfort, bedding management