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Title: Happy wings: Multifunctional elevated platforms to improve litter quality and broiler chickens welfare in commercial farm

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Abstract: Environmental enrichment with elevated platforms is an emerging approach to improve broiler chickens welfare. The objectives were to investigate the effects of elevated platforms with additional functionalities (cooling system and manure collection) on litter quality, welfare indicators and performance, and to test whether a cheaper cooling system material (plastic instead of steel) affected the platform' use. 10.000 one-day-old chicks (Ross 308) were allocated to 4 compartments for 36 days. 2 compartments were enriched with 6 platforms each (3 with steel and 3 with plastic cooling systems) and 2 compartments served as control. 241 birds per compartment were weighed at d1 and d30. The platforms' occupation was recorded daily. Litter quality was scored weekly and manure collected on the trays under the platforms was weighed and removed weekly. At d32, the dry matter, pH and electrical conductivity of the litter were evaluated. At d36, 40 birds per compartment were scored for plumage cleanliness, footpad dermatitis and hock burns. Statistics were performed using R, least-squares test was used for linear regression analysis and scores were analysed with Chi-square test. Platforms' occupation and manure quantities increased with age ($p<0.001$), but both did not indicate a preference between plastic and metal cooling systems ($p=0.265$, $p=0.603$ respectively). Platforms did not significantly affect the performance parameters (weight, average daily gain and mortality rate), nor any of the litter characteristics apart from the subjective litter scores (at starter phase $p=0.023$, at grower and finisher phases $p<0.001$). Broilers from the enriched compartments, showed less footpad dermatitis, fewer hock burns and cleaner feathers ($p<0.001$). This study revealed that the enrichment of a commercial farm with elevated multifunctional platforms improved the litter quality and associated welfare indicators without compromising broilers performance.