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Abstract & Author Information

Evaluating Silicon as an Alternative Indigestible Marker for Dry Matter Digestibility in Swine

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This study aimed to evaluate silicon (Si), an endogenous element, as a marker for estimating dry matter digestibility (DMD) in swine compared to added markers, such as acid-insoluble ash (AIA), titanium dioxide (TiO₂), and ytterbium oxide (Yb₂O₃) across four trials (T). T1 tested four diets with varying protein sources in pigs (Yb₂O₃ 0.005% and Celite 1%), T2 compared standard and high-fiber diets in piglets (TiO₂ 0.5% and Celite 1%), and T3 (Celite 1%) and T4 (TiO₂ 0.5%) evaluated diets differing in phytase doses in lactating sows. Ti, Yb, and Si concentrations were determined in diets and feces using ICP-OES 5900, and AIA was analysed following ECR n°152/2009. The inherent Si concentrations (1.8-2.5g/kg in Celite-supplemented diets and 0.25-0.30g/kg in non-supplemented) were used to calculate DMD, alongside added markers. Statistical analyses included diet, marker, and their interaction as fixed effects. No significant interactions between diet and marker were observed across all trials. In T1, AIA, Yb, and Si provided similar DMD estimates (84.6, 84.7, and 84.5%, respectively; $P=0.708$) with strong correlations between Si and AIA ($r=0.74$) and Si and Yb ($r=0.64$). In T2, Ti and Si yielded consistent results with no significant differences (80.2 and 80.9%, respectively; $P=0.081$; $r=0.85$). In T3 and 4, Si provided lower DMD values compared to AIA (78.8 vs. 82.3%; $P<0.001$) and Ti (80.3 vs. 84.9%; $P<0.001$), while still consistently estimating differences between diets with good correlations (Si vs. AIA, $r=0.65$; Si vs. Ti, $r=0.51$). Si shows promise as a digestibility marker under commercial conditions. Its endogenous presence eliminates the need for supplementation, reducing cost and simplifying diet formulation. Si's integration with routine mineral analyses and applicability to both trials and on-farm diets enhances its practicality and versatility. Future research should focus on optimizing Si as a reliable marker.

KEYWORDS

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Reviews