

# Ytterbium Oxide and Titanium Oxide: Comparative Analysis for Nutrient Flow Assessment in Growing Broilers

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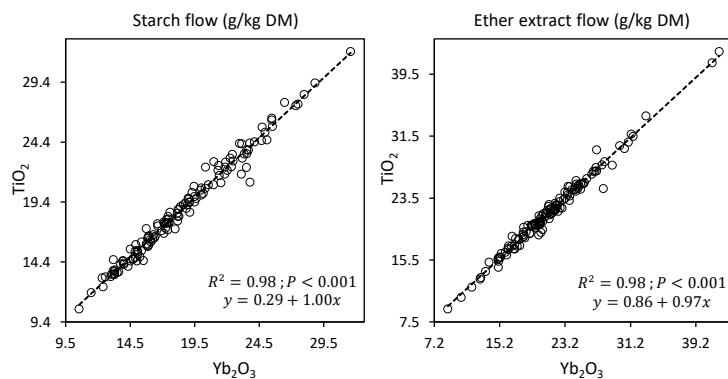


Figure 1 – Regression analysis between dietary flows in faeces (g per kg diet dry matter) using ytterbium oxide (Yb<sub>2</sub>O<sub>3</sub>) and titanium oxide (TiO<sub>2</sub>) as indigestible markers in growing broilers.

replicates/diet). Diets included 50mg/kg of Yb<sub>2</sub>O<sub>3</sub> and 2g/kg of TiO<sub>2</sub>. Feed was offered from d 16 to 25 in two periods (d16 to 20, and d 21 to 25) with or without an in-feed high dose of phytase (1,000FTU/kg), β-glucanase (16,000BXU/kg) and xylanase (20,000BU/kg) in consecutive periods. Excreta samples were collected on d 20 and d 25. Yb<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub> were assayed in diets and excreta acid hydrolysate samples using an optical emission spectrometer (ICP-OES 5900). Dietary energy and nutrient flow in excreta (kcal or g per kg of diet dry matter) were calculated using the index method. Data were analysed using the 'glmer()' function in R Studio to explore main effects and interactions of diets and markers, and regression analysis was used to explore the strength and direction of the relationship between Yb<sub>2</sub>O<sub>3</sub> and TiO<sub>2</sub> estimates.

No significant interactions ( $P > 0.05$ ) were observed between the marker and the cereal species, cereal variety, or enzyme supplementation on organic matter, gross energy, starch, nitrogen, ether extract, phosphorus, and calcium flows in excreta. No significant differences ( $P > 0.05$ ) were detected between the two markers in estimating these flows. Additionally, according to the regression analysis between flows estimates using the two types of markers, Yb<sub>2</sub>O<sub>3</sub> seems to have similar accuracy as TiO<sub>2</sub> for estimating the variability of dietary energy and nutrient flow in excreta. Figure 1 shows the regression analysis for starch and ether extract.

The results above show that Yb<sub>2</sub>O<sub>3</sub> inclusion at very low concentration in the diet (50mg/kg) provides similar values as TiO<sub>2</sub> for estimating the flow of dietary energy and nutrients in growing broilers. The Yb<sub>2</sub>O<sub>3</sub> appears to be a promising marker for digestibility studies.

Employing indigestible markers stands as a pivotal technique within nutrition studies for assessing feed digestibility in various segments and over the whole digestive tract of animals, allowing for ad libitum feed access and shorter collection periods. Two inert markers, ytterbium oxide (Yb<sub>2</sub>O<sub>3</sub>) and titanium oxide (TiO<sub>2</sub>), were compared in a study to assess the nutritional value variability of cereals in growing broilers.

Ross broiler-chicks ( $n = 432$ ) were assigned to 72 cages with 6 birds per cage. A single diet was offered from day 1 to day 15. Twelve diets were arranged in a 3 x 4 factorial of 3 cereals (barley, rye, and wheat) and 4 different varieties (B1-4, R1-4, W1-4) which were included at 40% in the diets from d 16 (6

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