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Vitamin D bio-enrichment of pork may offer a food-based strategy to increase vitamin D intakes in the UK population

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Hypovitaminosis D is prevalent worldwide, with many failing to achieve the recommended nutrient intake (RNI) for vitamin D (10–20μg/d)[(1)]. Moreover, the COVID-19 pandemic has re-emphasised the need to avoid vitamin D deficiency to help maintain immune function[(2)] and the urgent need for food-based strategies to help address this[(3)]. The aims of the current study were to 1) determine any changes to vitamin D intake and status over a 9-year period, and 2) apply dietary modelling to predict the impact of vitamin D bio-enrichment of pork and pork products on population intakes in the UK.

Data from the National Diet and Nutrition Survey (NDNS) Rolling Programme Year 1–9 (2008/09–2016/17) were analysed using SPSS to determine nationally representative mean vitamin D intakes and 25(OH)D concentrations [a robust biomarker of vitamin D status]. Subgroup analysis investigating variance in sex, age and season was conducted. Informed by previous studies[(4)], four theoretical dietary modelling scenarios of vitamin D pork bio-enrichment were analysed (vitamin D content + 50/100/150/200% vs standard).

Vitamin D intake in the UK population has not changed significantly from 2008 to 2017 yet, over the same period significant gender difference (M 2.66 ± 1.99μg/d and F 2.30 ± 1.66μg/d, $p < 0.05$) and seasonal variation in the mean 25(OH)D concentrations were evident. In 2016/17, across all age groups, 13.2% were considered insufficient (25(OH)D <25nmol/L). Across the whole group, theoretical modelling demonstrated an increase of 4.9, 10.1, 15.0 and 19.8% in daily vitamin D intake when vitamin D concentrations in bio-enriched pork were elevated by 50, 100, 150 and 200%, respectively. Based on the 200% modelling scenario, a greater relative change was observed in males (22.6%) compared to females (17.8%), and although older adults (65+ years) had significantly greater vitamin D intakes compared to other age categories (3.28 ± 2.27μg/day), this age group observed the smallest relative increase from the dietary modelling scenarios (14.3%). The greatest relative change was observed amongst 11–18-year olds, where 200% vitamin D bio- enrichment of pork and pork products would result in a 25.2% increase in mean daily vitamin D intakes.

Vitamin D intakes have remained stable in the UK across almost a decade, and current results confirm that strategies are required to help the population achieve the RNI for vitamin D. These findings align with Irish data and provides incentive to pursue bio-enrichment practices. Specifically, bio-enrichment of pork meat provides a proof of concept, demonstrating that animal-based strategies may offer an important contribution to help to improve the vitamin D intakes of the UK population, particularly adolescents.

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