



Effects of substituting red and processed red meats with faba beans on nutrient intake and environmental impact in UK adults

C.O. Bonham¹, Y. Kaimila^{1,4}, O.A. Olotu¹, M.E. Clegg^{1,2}, K.G. Jackson^{1,2,3} and J.A. Lovegrove^{1,2,3}

¹Hugh Sinclair Unit of Human Nutrition,

²Institute of Food, Nutrition and Health,

³Institute for Cardiovascular Metabolic Research, Harry Nursten Building, Pepper Lane, University of Reading, Reading, UK and

⁴The University of Malawi, Zomba, Malawi

Red and processed red meat consumption has been associated with increased cardiovascular disease (CVD) risk, greenhouse gas emissions and land use compared with plant-based diets^(1,2,3). Pulses (dry edible seeds of the legume family), a nutrient-rich plant food, are poorly consumed in UK diets which are typically high in meat. A particularly under consumed pulse is the faba (broad) bean, a nitrogen fixing, high yielding sustainable UK crop⁽⁴⁾. The objectives of these analyses were to determine i) associations between total meat consumption and nutrient intake, land use and CO² emissions ii) the impact of increasing faba bean intake at the expense of red and processed red meat in the average UK diet on nutrient intake, CO² emissions and land use.

The 4-day diet diary data from the UK National Diet and Nutrition Survey 2008–2019 for adults (19–64 years: n = 6136) was used. For objective i) these data were split into non-consumers of meat and tertiles of meat intake. Linear regression analysis (covariates: dietary energy, sex and age) compared nutrient intakes, land use and CO² emissions⁽⁵⁾ according to the level of meat consumption. For objective ii) the mean dietary intake for men (n = 2519) and women (n = 3617) were calculated, and varying quantities (10%–100%) of red and processed red meat were substituted by faba beans. The nutrient intakes across levels of substitution were compared to reference nutrient intakes (RNI).

Diets with the higher meat intakes (Tertile 3: 126–1000g/d) were associated with significantly lower CO² emissions (70.1 ± 24.5kgCO²eqv) and land usage (77.2 ± 29.2m²d) compared with the diet of non-meat consumers (77.8 ± 34.8kgCO²eqv, 88.8 ± 40.7m²d respectively), but significantly higher CO² emissions compared to diets with lower meat intake (Tertile 1: 1–76g/d) (65.4 ± 29.4kgCO²eqv) (all *p* < 0.01). Increasing substitution of red and processed red meat with faba beans in the average diet of men and women were associated with higher dietary intakes of total iron, AOAC fibre, potassium and magnesium, and lower dietary fats, haem iron, CO² emissions and land usage, where magnesium RNI was met at 20% substitution of both red and processed red meat, and at 100% of red meat substitution in females.

In conclusion, we found that diets highest in total meat were associated with higher fat and haem iron intakes and environmental impact when compared to those lower in meat, although not to non-meat consumers.

Furthermore, substitution of faba beans in replacement of red and processed red meat on a modelled average UK diet resulted in an increase in micronutrients, to levels closer to, or reaching RNI's, and a lower environmental impact. These data support recommendations to reduce red and processed red meat intake and move to a more plant-based diet.

Acknowledgments

Funding received from BBSRC (BB/W017946) for “Raising the Pulse” study

References

1. Abete I, Romaguera D, Vieira AR *et al.* (2014) *Br J Nutr* **112**, 762–75.
2. Xu XM, Sharma P, Shu SJ *et al.* (2021) *Nat Food* **2**, 724.
3. Marventano S, Pulido MI, Sanchez-Gonzalez C *et al.* (2017) *Public Health Nutr* **20**, 245–54.
4. Baddeley JA, Jones S, Topp CFE *et al.* (2013) *Legumes Futures Report* **1**(5).
5. Hobbs DA, Durrant C, Elliott J *et al.* (2020) *Eur J Nutr* **59**, 895–908.