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1 **Regarding: The impacts of partial replacement of red and processed meat with legumes or cereals**
2 **on protein and amino acid intakes: a modelling study in the Finnish adult population**

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10 Dear Editor,

11 Simojoki *et al.* (1) reported estimates of protein and amino acid inadequacy in a national sample
12 before and after simulation scenarios of partial replacement of total red meat with plant protein
13 sources. We were very surprised by the very high figures for the proportion of people who
14 apparently did not meet requirements. The lowest estimates were for adults aged 18-64y, but 5-7%
15 inadequacy in protein intake in a reference population is still very high, increasing up to 10% in the
16 replacement scenarios. In contrast, we and others, have found virtually no insufficient protein intake
17 in comparable western countries, e.g., 0.3% in French adults of the same age (2). Higher figures can
18 be found in the literature but are explained by methodological shortcomings (3).

19 Although the authors relied on only two 24h recalls, they used a very good method to estimate usual
20 intakes and then adequacy, but they did not account for the common problem of under-reporting.
21 The authors acknowledged this limitation but gave no indication of the importance of this bias. We
22 calculated the ranges of variation in energy intake from the precision estimates of the means and
23 sample sizes, and derived that the lower range of usual energy intake was ~600kcal, and that ~10% of
24 the men aged 18-64y had intakes <1200kcal. Using individual data with impossibly low usual energy
25 intakes greatly overestimates the proportion of people with insufficient protein and amino acid
26 intakes. Of note, since the bias was the same for protein and amino acids, the authors' finding that
27 amino acid inadequacy was always much lower than protein inadequacy is correct, and confirms that
28 protein is a matter of quantity not quality when taken at the authentic level of the diet (2). However,
29 we were surprised that lysine did not top the list in the cereal scenario (2) and we think that this may
30 be due to the very high lysine content reported for the cereal aggregate used.

31 Not excluding under-reporters may also be sufficient to explain the increase in inadequacy estimates
32 in the scenarios where meat was replaced by lower-protein plant sources, but this increase was
33 further overestimated by the use of non-isoenergetic substitution scenarios. For men aged 18-64y,
34 the scenarios led to up to a further 5% reduction in energy intake, which should mean ~5% decrease
35 in protein intake and seems to explain almost half of the increase in inadequacy estimates.

36 Although the authors remain cautious in their conclusion, we believe it is important to analyze the
37 sensitivity to potential methodological pitfalls and to have accurate estimates of the risk of
38 deficiency. This is crucial to avoid conflating nutrients with energy and pointing the finger at the
39 wrong nutritional issue in the dietary transition in high-income countries. When replacing meat with
40 plant sources in healthy diets, the nutrients of concern in energy-replete populations are neither
41 protein (4) nor amino acids (3, 5). As expressed by the authors, replacing red meat with healthy plant
42 sources offers benefits for long-term human and planetary health.

43 **Author contributions**

44 FM, CG, HF and JFH discussed and approved the conception of the work. FM wrote the first draft. CG,
45 HF and JFH reviewed the work for intellectual content. All authors approve the final version of the
46 work to be published and agree to be accountable for all aspects of the work.

47 **Disclosure of interest**

48 The authors report no conflict of interest.

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51 **Data availability statement**

52 The spreadsheet will be made available upon reasonable request.

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