

Reviewer's report

Title: The added nutritional value of grass-fed beef.

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Reviewer: M M Campo

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The subject of the paper is of current interest. However, as it states, I cannot recommend the publication without modifying. As a review, it should contain the most relevant papers in their field, and some are missing (Wood et al., Meat Sci., 2004; 2008; Scollan et al., Meat Sci, 2006; Alison et al., Meat Sci, 2009); furthermore, some discussion is not completely accurate. However, my main concern is about the subjective discussion, which sometimes does not account for the whole evidence, which makes some of the discussion not objective enough.

Starting with the title, it directly implies that the nutritional value from grass-fed beef is better than from other husbandry practises, where in fact it is what authors want to review. In my opinion, only objective aspects should be included.

In general, the paper has focused on nutrients related to the lipid fraction of the muscle, i.e. fatty acids and lipid-soluble compounds, although cholesterol has been hardly mentioned. However, there are more nutrients that can be different according to the feeding system of the animal. Therefore, the title should be more precise as to the subject of the paper.

For a Journal with a world wide horizon, the particular view of authors should not be restricted only to the population of the USA, especially when most articles in references have been performed in other continents. Some considerations are not exclusive from citizens of the USA.

In several parts of the paper there is the affirmation that grass-finished beef products are lower in fat than grain-fed products. Unfortunately, that is not completely correct, since

authors have forgotten that there are a wide range of the so-call grain-fed and grass-fed systems, which is the reason why some of the data are contradictory. Moreover, commercially beef is slaughtered at a younger age if produced under grain conditions, which imply less fat in the meat than if those animals were to be slaughtered at the same age (De la Fuente et al., 2009, Meat Science, 82, 331-337). As they have observed, pure intensive systems produces younger beef with less intramuscular fat (1.67%) than pure extensive systems (1.74-2.35%) or mixed systems (2.92%). Therefore, the abstract (line 10), page 7 line 6 and page 20, line 1 should be changed. Especially the comment in page 7 has not been probed, since Table 1 shows the increment in IM fat due to the age of the animal, not to the fact of being grain-fed animals. Indeed, after looking at Warren et al., 2008, one can see that animals fed silage show higher amount of fat than those fed conventional grain systems.

Specific comments:

- Page 3, line 18. Other Institutions worldwide have also recommend intakes. It would add value to the article if the information includes them, such as the British COMA.
- I do not disagree with the importance of the intake of saturated fats in the development of cardiovascular diseases. However, supporting this idea with a reference from 1970 (Keys) in a review, when more recent papers have show the implication of other factors seems not too serious.
- Page 4, 2nd paragraph. It is always interesting to talk about percentages, but it would be clearer to talk as well about quantities. How much is the real decrease in the intake, and how much has the real incidence of CVD changed in the population in the same period? If these values are not clear, authors consider SFA as the cause of CVD, and they relate SFA to the consumption of meat, avoiding any discussion to other factors or other products from vegetable origin, such as palm or coconut oil. This point is partially discussed in page 5 line 3. However, besides the improves in medical care, authors never wonders about the implication of genetics, maternal feeding, consumption habits or other ingredients

in the diet, such as sweets, in the incidence of CVD. Are they really due only to animal fat?

- Page 6, line 17. How much of this percentage is due to ruminant meat and how much to other species, especially pork? The paper is focused in grass-fed animals, i.e., beef. However, most pork does not graze and milk is neither considered.

- Page 8, line 8. Authors have not really reviewed enough papers to write this affirmation, lacking discussion about when this is not true. At the end of the meal, we do not eat percentages but real quantities. How much saturated fat is there in grass-fed versus grain-fed animals? De la Fuente et al (2009) have shown that intensively fed commercial yearlings have significantly lower levels than semi or extensively fed steers. Again, authors have missed the influence of age at slaughter, gender and husbandry practices in the fatty acid composition of the animal.

- Page 9, line 17. The transformation of ALA to EPA or DHA is partial, not total. The body incorporates long n-3 PUFA easier than it transforms ALA to long n-3 PUFA.

- Page 10, 2nd paragraph. There are more factors influencing suicidal behaviours, and that should be suggested by authors. Indeed, Japan has a high intake of n-3 PUFA and a high suicidal rate, as well.

- Page 12, line 8. Recent evidence (Dugan et al., *Lipids* 42, 509-518; *Can. J. Anim. Sci.*, 88, 591-599) suggest that t10,c12CLA is not the second most important isomer.

- Page 16, line 10. Is correct the data of 0.5 g/g?