Comment on S´ rednicka-Tober et al.: Higher PUFA and n-3 PUFA, conjugated linoleic acid, α-tocopherol and iron, but lower iodine and selenium concentrations in organic milk: a systematic literature review and meta- and redundancy analyses

Article

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Invited Commentary

Comment on Średnicka-Tober *et al.*: Higher PUFA and *n*-3 PUFA, conjugated linoleic acid, α-tocopherol and iron, but lower iodine and selenium concentrations in organic milk: a systematic literature review and meta- and redundancy analyses

The paper of Średnicka-Tober *et al.*[1] presents the results of a systematic literature review and meta-analysis comparing nutritional characteristics in milk from conventional and. organic production systems. The paper clearly represents a substantial amount of work and will no doubt be a useful reference by which future studies will be compared. However, we have concerns over how the data have been presented, which has led to considerable misinterpretation by the media. In addition, it is unfortunate that data on the actual concentrations of nutrients are only available in the online Supplementary Tables (Tables S9 and S10 in particular).

A key concern relates to the overwhelming emphasis on mean percentage change (presented in the Results section and in the online Supplementary Table S9) as the principle measure of differences between systems, as this often implies a greater change than is nutritionally relevant. Moreover, for milk fatty acid concentrations (online Supplementary Table S10), the values reported are those in the milk fat fraction and were not reported in the whole milk, which can be misleading. It is important to assess and discuss the impact of the observed differences in the context of a typical whole diet. This is illustrated in Table 1. For example, the online Supplementary Table S10 shows that the concentration of total *n*-3 fatty acids was 6·69 mg/g total fatty acids in conventional milk but significantly higher at 10·22 mg/g total fatty acids in organic milk, an increase of 53 %. On the basis of the mean UK male adult (19–64 years) consuming 12·4 g/d of dairy fat including butter[2] (giving 11·6 g of dairy fatty acids), if organic milk and its derived foods were to replace all conventional dairy foods consumed, total *n*-3 fatty acid intake would increase by approximately 41 mg/d in a diet already supplying 2200 mg/d – an increase of about 1·8 %. Therefore, the effect of exchanging all dairy foods for organic in an average diet would be negligible.

Curiously, in the organic milk, α-linolenic acid (ALA) and very long-chain (VLC) *n*-3 (EPA + DPA + DHA) fatty acids represent 76 and 21 % of total *n*-3 fatty acids, respectively, with ALA + VLC *n*-3 therefore representing 97 % of the total *n*-3 fatty acids. In the conventional milk, the values are 65·5 % ALA and 21·1 % VLC *n*-3; thus, ALA + VLC *n*-3 represent only 86·5 % of the total *n*-3 (online Supplementary Table S10). It is not clear what other *n*-3 fatty acids are 'missing' from conventional milk. In any event, the vast majority of the *n*-3 fatty acid family in both types of milk is ALA, and the very inefficient desaturation and elongation of ALA to the functional VLC *n*-3 has been well recognised for some time[3]. At mean current intakes of dairy fat by men (12·4 g/d[2]), the organic milk and derived foods would increase intake of the VLC *n*-3 fatty acids by approximately 5·9 mg/d of EPA + DHA or 8·9 mg/d of EPA + DHA + DPA; in either case, it is an extremely small amount relative to the daily intake target of 450 mg of EPA + DHA[4]. Overall, such small changes in intakes of *n*-3 fatty acids are unlikely to represent any nutritional or health benefit to the average consumer. It should be noted, however, that the amount of data that contributed to the VLC *n*-3 values was very small – that is *n* 8, *n* 5 and *n* 3 for EPA, DPA and DHA, respectively (online Supplementary Table S9, though '*n*' values in online Supplementary Table S10 are different) – and further data are clearly needed to strengthen the evidence for these important fatty acids.

The smaller *n*-6:*n*-3 fatty acid ratio observed in the organic milk is discussed as potentially beneficial. The online Supplementary Table S9 indicates that organic milk had a 71 % lower *n*-6:*n*-3 ratio than conventional milk, although using values in the online Supplementary Table S10 the reduction is only 34 % and this translates into virtually nothing in a typical diet (Table 1). In any event, there is increasing doubt as to the value of this ratio. On the basis of the Quantification of Optimal *n*-6/*n*-3 ratio in the UK Diet (OPTILIP) study, Griffin[5] concluded that the *n*-6:*n*-3 ratio has no value in modifying CVD risk, but the absolute amounts of dietary linoleic acid and ALA are of relevance to the efficiency of conversion of ALA to VLC *n*-3 fatty acids.

The study included data from a large cross-European farm and milk quality survey with organic and conventional production with contrasting feeding systems. The authors concluded that the findings confirm that feeding system is the main reason for the differences in milk fatty acid composition between organic and conventional milk production. Furthermore, the higher amount of grazing used in organic and some conventional production systems was the main driver. If this is correct, then milk from non-organic systems in which cows are fed fresh forage will have the same composition as from organic systems. This is confirmed by other studies including that by

Table 1. Effect of translating milk fatty acids (FA) in conventional (Con) and organic (Org) milk fat from Średnicka-Tober *et al.*[1] to total dairy and total dietary intake

	Milk FA (mg/g total FA)*		% change	Intake from all dairy foods (mg/d)†			Intake from total diet (mg/d)‡		% change in total diet
FA	Org	Con	Org–Con	Org	Con	Org–Con	Org	Con	Org–Con
PUFA	41·42	36·31	14·1	480·5	421·2	59·3	13 459	13 400	0·44
n-6 FA	22·45	22·79	–1·5	260·4	264·4	–4·0	11 196	11 200	–0·04
n-3 FA	10·22	6·69	52·8	118·6	77·6	41·0	2241	2200	1·86
ALA	7·73	4·38	76·5	89·7	50·8	38·9	–	–	–
EPA	0·87	0·56	55·4	10·1	6·5	3·6	–	–	–
DPA	1·02	0·76	34·2	11·8	8·8	3·0	–	–	–
DHA	0·29	0·09	222·2	3·4	1·0	2·4	–	–	–
EPA + DHA	1·16	0·65	78·5	13·5	7·5	6·0	–	–	–
VLC *n*-3	2·18	1·41	54·6	25·3	16·4	8·9	–	–	–
n-6:*n*-3	3·56	5·42	–34·3	–	–	–	5·0	5·1	– 2·0

* From the online Supplementary Table S10.
† Based on intake of 11·6 g/d dairy FA by adult men[2].
‡ Conventional intake from Bates *et al.*[2].

Couvreur *et al.*[6] who showed that increasing grazing from 30 to 100 % of the diet led to an increase in milk ALA from 4·0 to 6·1 mg/g total fatty acids ($P < 0.001$), similar to those reported by Średnicka-Tober *et al.*[1] shown in Table 1 for conventional and organic milk, respectively.

Overall, differences in milk fatty acids in organic *v.* conventional systems are extremely small when examined in the context of total diets and would have very limited contribution to nutrition or health – and the differences are because of the diet of the cow and not specifically because of organic production.

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