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A Review of Nutritional Characteristics of Organic Animal Foods: Eggs, Milk, and Meat

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Abstract

It is known there are many environmental benefits when food is grown in the organic system. However, there is little scientific evidence to identify the variations and the real benefits of the nutrient levels of organic food. Therefore this review aimed to clarify the nutritional characteristics of organic foods such as eggs, milk, and meat and highlight the importance of its production in the world and in Brazil. The research showed the difference between the profile of lipids on meats, eggs and dairy products obtained from both organic systems and conventional ones. For example, Conjugated Linolenic Acid (CLA), Polyunsaturated Fatty Acid (PUFA) can be higher in cheeses and meat, but not in eggs or chicken. The results for levels of protein, minerals or cholesterol from analyses are inconclusive. In conclusion, few studies show better nutritional value from organic eggs, milk or meat. However, we can claim that higher PUFA in meat and cheese give them a better quality as observed in the majority of the studies. The selected studies are organized and showed in tables with data of nutrients, food, and characteristics of the essay.

Keywords: Organic production; Organic meat; Animal foods; Organic animal foods; Food composition

Introduction

The study of organic foods since the mid-1980s has been in the spotlight for environmentalists, farmers and consumers. Food researchers have explored the composition to confirm or not the nutritional value and effects on human health from food so-called organic.

The "*organic*", "*biological*", "*biodynamic*" and "*agro-ecological*" food has been related to the food production system, which forbids the use of chemical fertilizers, pesticides and intensive animal husbandry. In organic products, the use of external inputs and the use of synthetic fertilizers and growers are avoided; the organic livestock seeks to prevent diseases, to progressively eliminate the use of veterinary chemical allopathic drugs, to reduce feeding with animal source products, and to maintain the health and the welfare of the animals [1].

According to scientific evidence, the soil conservation and biodiversity are improved in organic farming, that proves the benefits to environmental and sustainability of organic foods [2,3].

The motivation for the consumption of products so-called organic is originated from the concern with the environment and conservation of natural resources [4-8]. An additional motivation is the perception that organics are healthier and safe products since they are free of pesticide residues [7-9].

The nutritional value, however, should be better investigated to be included or not or even partially as motivation and benefit of organic foods. In general, there are few differences in nutrient concentration between the organic and conventional, whether macro or micronutrients are evaluated. According to data from the French Food Safety Agency [10] and extensive studies from European Parliament [11], organic foods may have higher levels of minerals, polyunsaturated fatty acids (PUFA) and phytochemical compounds. Other authors also suggested a trend of higher content of functional compounds in plant foodstuffs [10,12-15].

In contrast to the numerous studies conducted over these decades about the variation in nutrients and phytochemical levels in vegetables, fewer studies covered animal source food. The changing nutritional composition of animal source foods should be investigated to establish real health benefits of an organic-based diet.

In this review, reported studies are on the changes in the chemical composition of eggs, milk, dairy products and meat from animals reared from the organic system. It analyses organically produced foodstuffs in comparison to conventional foods and their possible impact on human health.

The composition of organic eggs × conventional eggs

Protein: Researchers that assessed protein concentration also found no differences between the two types of poultry raising and egg collection [16,17].

Lipids, fatty acid and cholesterol: The comparison between the total lipid amount in the organic eggs and conventional eggs are inconclusive. While the results found by Mizumoto et al. [16] indicated that there are reduced levels (8.3 × 9.16 g% egg), results from Hidalgo et al. [17] (10.1 × 9.5% egg) and Samman et al. [18] (4.45 × 4.43% yolk) found no relevant difference in the total lipids in organic eggs. Besides the little difference, the proportions of lipids in eggs are compatible with the food composition table, which indicates that conventional eggs have 10.7% (USDA). It is not evident that there is less or more lipid in organic eggs.

The results of the concentration of Saturated Fatty Acids (SFA) are also inconclusive. Chemical analysis of organic eggs from the metropolitan area of Sydney, Australia [18] or the Italian market [17] showed higher SFA. In an experimental study, Mugnai et al. [19] showed the more significant difference in SFA levels during the four seasons in the year, such as 60 to 68 g and 82.1 to 85.7 g/kg yolk in organic eggs and in conventional husbandry system, respectively.

The higher concentration of w-3 fatty acid in organic eggs (6.2-7.7 g/kg yolk) compared to conventional ones was observed only in one study [19].

Regarding evaluation of the cholesterol content, it was found that organic eggs have the same amount as no organic eggs [16,19].

Minerals: Although the comparison of the presence of minerals indicates possible modifications for Fe, Zn, and Se, the data should be evaluated with caution due to the inconsistency of results. Higher iron content in organic eggs (about 2 mg% fresh matter) was found compared to that of non-organic production (about 1.6 mg% fresh matter), but without statistical differences; the amount of calcium and magnesium were similar in the evaluated eggs [16].

Finally, few studies compare the chemical nutritional characteristics of organic or non-organic eggs, even though these foods are frequent in the organic consumer's diet [20]. The potential health benefits could be the lower SFA and the higher w-3 fatty acids and lower atherogenic index [19].

The composition of organic milk and dairy products × conventional milk and dairy products

Milk and dairy products are an important group of organic foods, being the most purchased items among consumers in Denmark and the United Kingdom [20], and the third more significant commodity within the global organic food market, after fruits and vegetables [21].

For milk obtained from organic and conventional production, the most evident changes occur for lipids profile, and yet there is no agreement among researchers regarding the amount of total lipids or protein. Table 1 summarizes the quantitative data for lipids and protein from several studies.

Protein: The amount of protein in the milk from conventional and organic production ranges between 2.66 to 3.35% and 2.9 to 3.87% respectively (Table 1). It is possible to observe a small increase [22-24] or decrease [25] in protein levels. Beside this conflicting data, some researchers reported no differences for proteins in organic or conventional milk [22,24].

On the other hand, there is a consensus that nutrient concentrations depend on climate period [22-26]. This variation may hinder the establishment of differences between milk products from different production systems.

Lipids: The amount of lipid has opposite tendency to that of protein in the studies of organic dairy. While Fanti et al. [23] concluded that the concentration of total lipids is lower in organic milk in Brazil (3.1 × 3.29 mg%), Butler et al. [24] found higher values in the United Kingdom (3.7 × 3.4 mg%) but no difference was identified by other researchers [27]. However, in meta-analysis study, higher fat content in the organic samples was observed in several European countries [28].

w-3 fatty acids: Changes in the fatty acid profiles especially in w-3 polyunsaturated have been observed in several experimental studies [24,26,27] and reviews [11,28,29] about organic products.

Organic milk samples from Italian markets [27] or even from producers in the United Kingdom, during a period of twelve months, showed significant differences in the w-3 content of 1.5 to 1.8-fold compared to non-organic milk [24,26]. Different data was observed in fatty acids amount present in organic and conventional milk marketed in São Paulo [23] (Table 1).

The differences in feeding regime between conventional and organic dairy products are suspected to be the reason behind these w-3 levels [11,28]. Besides this, the seasonality is an important interfering factor in milk composition as observed in an all-year study [22]. The comparison of data from a number of organic producers in Sweden, monitored during one year, showed no differences in individual fatty acids compared to the conventional product [22].

The superiority in w-3 concentration is likely to occur due to increased availability of fatty acids in the pasture used in the organic dairy production system. The greater proportion of Omega series can increase milk quality due to the beneficial effects of those fatty acids, in particular on cardiovascular diseases [11,30].

Table 1: Comparison of composition between organic and conventional milk

	Conventional	Organic*	Reference	Additional information on the samples used in the studies
Protein (%)	3.35	3.39	[22]	Raw milk, in Sweden
	3.01 to 3.19[a]	3.22 to 3.42[b]	[23]	Pasteurized milk, during a period of one year
	3.17	3.18	[24]	Raw and pasteurized milk, in the United Kingdom
	2,66 to 3,92[a]	2,9 to 3,87[b]	[25]	Raw milk, from organic farm system, during a period of one year
Total lipids (%)	4.28	4.25	[22]	Raw milk, in Sweden
	3.39 to 3.49[a]	2.67 to 3.32[b]	[23]	Pasteurized milk, during a period of one year
	3.49[a]	3.75[b]	[24]	Raw and pasteurized milk in the United Kingdom
	3.31 to 7.0[a]	3.37 to 6.6[b]	[25]	Raw milk, from organic farm system, during a year period
PUFA (% of total fatty acids)	4.17 to 5.6[a]	3.13 to 3.9[b]	[23]	Pasteurized milk, during a period of one year
	3.18[a]	3.94[b]	[24]	Raw and pasteurized milk in the United Kingdom
	3.33[a]	3.89[b]	[26]	Pasteurized milk in the United Kingdom
n-3 fatty acids (% of total fatty acids)	0.55 to 0.71[a]	0.19 to 0.64[b]	[23]	Pasteurized milk, during a period of one year
	0.44[a]	0.69[b]	[24]	Raw and pasteurized milk in the United Kingdom
	0.66[a]	1.11[b]	[26]	Pasteurized milk in the United Kingdom
	0.52	0.6	[27]	Milk marketed in Italy
CLA (% of total fatty acids)	0.55 to 0.93[a]	0.69 to 1.68[b]	[23]	Pasteurized milk, during a period of one year
	0.56[a]	0.74[b]	[24]	Raw and pasteurized milk in the United Kingdom
	0.58	0.65	[26]	Pasteurized milk in the United Kingdom
	0.34[a]	0.61 to 0.80[b]	[32]	Milk produced using feedlot or pasture in Hamburg/Germany
	0.51	0.63	[27]	Milk marketed in Italy

[a,b] different letters indicate significantly different values between the component present in the convention and organic milk in each experiment

Conjugated fatty acid: Still, regarding the characterization of the lipid fraction, the content of Conjugated Linoleic Acid (CLA) in organic production has also been investigated. These geometric isomers derived from linoleic acid have been attracting attention, since there are possible effects on human health, particularly on cancer, atherosclerosis, inflammation, and obesity, with physiological activity on lipid metabolism, immunomodulation, and oxidative stress [31].

Milk and dairy products obtained from the organic system have higher amounts of these isomers compared to non-organic milk in most studies [11,23,24,27,28,32-34]. Evaluating raw milk produced organically, Jahreis et al. [32] found significantly greater concentrations of CLA and vaccenic acid (octadec-11-enoic acid), compared to milk produced in conventional systems. Also, Butler et al. [24] and Fanti et al. [23] observed higher levels of CLA in pasteurized milk obtained at different times of the year, which ranged from 0.69 to 1.68 g, and 0.55 to 0.71 g in 100 g of fat of organic and non-organic product, respectively [23] (Table 1). A meta-analysis review found that the CLA amount was 25% higher in concentration in organic milk [28].

The higher values are maintained in several dairy products, such as butter and cheese [27,35], as well as fermented milk [33].

Some authors reported no significant difference between the fatty acid in organic or no organic milk [22,26], owing to the great variation this compounds throughout the year for organic and conventional products [26,28].

Animal feeding is considered to be the main determining factor of fatty acids presented as conjugated in dairy products [35]. Higher levels of CLA observed in organic milk occur due to increased amounts of PUFAs and fiber in cattle feed on the organic system compared to conventional system. This fact allows the formation of CLA from biohydrogenation by rumen bacteria, justifying the results obtained [27,32].

The greater CLA concentration in organic products obtained from most studies could help increase the consumption of these compounds that have potential functional action on the human body.

Although effects on human health are questionable [31], organic dairy products could be sources of CLA and contribute for the intake of 3 g/day, which is considered the requirement for the proposed benefits of these fatty acids [36].

According to data obtained in dairy products at different times of the year [23], consumption of the organic product would provide about 41 to 101 mg in every serving of 200 g of whole milk compared to conventional, which provides 33 to 43 mg of CLA.

Vitamins: Vitamins in organic milk have been poorly evaluated. The amount of α-tocopherol is higher in organic than compared to conventional systems according to experimental studies and meta-analysis. No conclusive data has been obtained from the other lipid soluble vitamins. Cholecalciferol (Vitamin D3) and mono-hydroxycholecalciferol were quantified using a highly sensitive method; no statistical difference was observed [37]. Results in Italian dairy showed by Bergamo et al. [27] indicated a greater content of Vitamin E and β-carotene in organic milk. The recent meta-analyses confirm a higher level of α-tocopherol [29] but not of β-carotene level [28,29].

Minerals: Some minerals, such as zinc, iron, selenium, and iodine were evaluated, but no studies have compared the calcium content between milk from conventional and organic productions. Data obtained in Scandinavia and Spain did not suggest differences in iodine concentration, but slightly smaller amounts of selenium in organic milk [22,38]. It is noteworthy, however, that mineral concentration in the milk varies at different seasons of the year [22] and depends on pasture and soil characteristics, hindering the interpretation of the data from different climates or geographical territories.

In summary, the choice of the management system, in addition to seasonality, influences the composition of milk and dairy products, in particular on conjugated fatty acids content. However, there is no consensus regarding the greater content of polyunsaturated and lower content of total lipids and proteins. Along with these observations, the scarce number of studies on micronutrient allows affirming that significant changes in the nutritional value of organic milk occur only for lipid quality, according to the majority of the studies.

Factors that influence milk composition include breed, lactation period, climatic conditions, grazing, feed, and other management conditions [39], as well as factors related to product processing and distribution. Moreover, the methodology and length of the studies on organic foods, in general, may be responsible for the conflicting and inconclusive data [9]. Studies that describe and consider all variables are scarce, thus, results from those studies that evaluate products available for consumption on the market become of particular interest for concluding whether organic is beneficial or not.

The composition of organic meat × conventional meat

Animal tissue composition is influenced by environmental conditions besides being defined by the species, gender, or age at slaughter.

The studies indicate that the feed based on grazing or forage is a main modifying factor in the nutritional composition of the meat. The lipid content appears to be the most affected component in meat composition obtained from organic system farming [11,29,40,41]. The researches have been carried out with cattle, lambs, pigs or chicken herds from organic systems around the world, comparing these with those from conventional systems [42-50].

The studies have indicated that there are variations in quantity and quality of lipids whereas there is limited data on other nutrient as mineral and vitamin concentrations. In general, reduced lipids [42,43,45,46,51-53] and increased content of total unsaturated fatty acids, and content of conjugated fatty acids were observed in animals raised in an organic system [43,49,51-56].

Lipid content in organic in meats: In an extensive review, Srednicka-Tober et al. [29] evaluated the outcomes from European, USA and Brazilian studies, and concluded that there are a lower fat content and higher PUFA in organic meat than compared to conventional meat considering different species animals.

Similar findings were observed in other studies [52-54], which found lower fat content in meat from cattle on pasture as unique feeding system than compared to the ones from the conventional system. The intramuscular lipid content was reduced from 25 to 45% in meat from animals on pasture [52,53,55,57]. Minor changes, of about 15%, were obtained in the evaluation from a group of researchers from Germany [51,54] and Portugal [56]. However in swine or lambs from the organic system, the average of lipids content can be slightly lower (1.2 × 1.6%) [45] or no different [42,50] in comparison to those from conventional systems.

As for poultry, a decrease in lipid content was observed by most researchers [43,46,47]. Percentage of intramuscular fat in breast fillet [46] or in drumstick [43] was lower in organic than in conventional chickens (0.27-2.8% × 0.4-5%). Although the values were lower in chicken marketed in the United Kingdom no significant differences were detected in the fat content of organic over non-organic [44], as shown in table 2.

Meta-analysis study also showed fat can be as high as 20% in beef and poultry in conventional systems, and there is little evidence on pork or lamb [29].

Data on cholesterol content in organic meat is very restricted, and small differences were reported for this component using tissues from cattle [52,55] and chicken [44], compared to ones from the conventional raising system. This data could be a positive factor to organic meat as healthier meat since lower cholesterol (Table 2) and higher w-3 PUFA (Table 3) suggest a lower risk of cardiovascular disease.

The following table displays the values of cholesterol and total lipids obtained in several studies in beef and chicken meat. These species have been more evaluated in the researches about organic meat than swine or lambs.

Lipid profile: Table 3 shows the results found by researchers on lipid characterization in organic meat. Several studies indicated small differences in the proportion of saturated fatty acids in grass-fed beef [52,54,55] and between organic and non-organic chickens [43,44]. The data was inconclusive towards the lower levels of saturated fatty acids in the organic meat marketed in southern Brazil when compared to non-organic ones [49].

The PUFA in intramuscular fat of conventional products showed lower proportion in beef marketed in Argentina [55], Brazil [49] or in the meat of animals raised in Germany [51] and North America [52]. In organic poultry, the results are also significantly different according to results from Castellini et al. [43] and Jahan et al. [44]. Therefore the increased PUFA level remained, even when considering variations between lines, breeds, or region of origin of the animals [43,51,52].

Data from the study that reports compositional aspects of meat (mainly beef, chicken, lamb, and pork) from organic and conventional husbandry, covering several countries in the world, concluded that the content of PUFA is 23% higher in organic meat [29].

w-3 fatty acid: Regarding the concentration of w-3 fatty acid series, levels can reach up to five times more in organic beef meat [49,52,54-56]. According to data from these researchers, 24 and 108 mg [52] or even 35 and 112 mg of w-3 fatty acid [54] are found for each 100 g of beef from animals on pasture and convention systems, respectively. This data indicates that a portion of organic meat could meet the recommended amount of 1.1 and 1.6 g/day of w-3 suggested for adult women and men [58].

w6:w3 fatty acid ratio: In addition to higher w-3 fatty acid in organic meats, the proportion w-6:w-3 has also been reported to be significantly reduced in cattle raising organic farming. Lower ratio w-6:w-3 is associated with beneficial effects to reduce cardiovascular disease risk. The data showed a significant decrease w-3:w-6, from about 8:1 in conventional cattle meat to 2:1, in organic ones [51,52,54,56]. There is less evidence of the increase in w-3 composition to organic chicken. As showed in table 3, higher [43,59] and w-3 lower level [44] were observed in chemical analysis in fresh and frozen or chilled chicken breast. There is no evident reduction of w-3, as well as higher n-6:n-3 ratio, suggesting undesirable nutritional characteristics in organic chicken [44].

Changes in the levels of saturated and unsaturated fatty acids are more evident in ruminants than in monogastrics, as observed in the studies. The ruminal biohydrogenation and greater presence of linoleic acid in the pasture are responsible for the greater incorporation of these fatty acids in the animal tissue of cattle [29,40,41,54].

Conjugated Linoleic Acid-CLA: In addition, the conjugated fatty acids (CLA) should be considered a positive factor in grazing cattle. This isomer is synthesized as an intermediate of the w-3 or -6 fatty acids through ruminal bacterial hydrogenation, absorbed and then incorporated in the animal adipose tissue, or even in the milk [59].

The greater CLA amount was confirmed in analyses of different studies with animals on organic systems or pasture [51,52,54-56].

These observations could suggest that meat obtained from organic herds present a positive health profile since that higher CLA and the lower w-6:w-3 ratio is beneficial characteristics for reducing the risk of chronic diseases, such as cardiovascular and other chronic inflammatory diseases [30,31].

Contents of protein and minerals: The protein levels could be lower in animals raised in conventional systems due to an increased confinement space than the ones raised in an organic system. No differences have been reported regarding the levels of this nutrient in cattle [52], pigs [60] or chicken [43]. No difference has been observed in protein amount although there is little data available to compare protein in conventional and organic meat, as shown in this review and in the meta-analysis study [29].

Table 2: Comparison of Lipid Composition between Organic and Conventional Meats

	Conventional	Organic*	Reference	Additional information on the samples used in the studies
				BEEF
Intramuscular lipids mg/100 g	1.7 to 4.54[a**]	1.98 to 3.9[a]	[54]	Holstein and Simmental Germany
	2.67 to 2.6[a]	2.3 to 1.5[b]	[51]	Holstein and Simmental Germany
	3.18[a]	1.68[b]	[57]	Uruguay
	4.4[a]	2.8[b]	[52]	USA
	3.85[a]	2.86[b]	[55]	Argentina
	1.4 to 1.3[a]	0.9[a]	[56]	Beef from grass-fed and confined animals/Alantejo PT
				CHICKEN
	2.37[a]	0.74[b]	[43]	Chicken breasts harvested at 81 days
	5.0[a]	2.8[b]		Chicken drumsticks harvested at 81 days
	0.9 to 1.23[a]	0.78 to 0.92[a]	[44]	Chilled or frozen chicken breasts/Scotland
	0.486[a]	0.277[b]	[46]	Chicken breasts/England
				BEEF
Cholesterol mg/100 g	45.8[a]	40.3[b]	[55]	Different breeds/Argentina
	54.6[a]	54.0[a]	[52]	USA
				CHICKEN
	40.1 to 47.6	24.5 to 43.8	[44]	Chilled or frozen breasts/Scotland
	62.7	53.7	[59]	Chicken breasts

*Meat obtained from animals certified as organic or animals raised on systems similar to organic, i.e. just on pasture
[a,b] Different letters indicate statistical differences within studies

Table 3: Comparison of Lipid Profiles in Organic and Conventional Meats

	Conventional	Organic*	Reference	Additional information on the samples used in the studies
Saturated fatty acids (% of total fatty acids)			**BEEF**	
	40.3^{a} to 43.4^{b}	45.2^{b}	[54]	Holstein and Simmental/Germany
	44.49^{a} to 43.6^{a}	43.9^{a} to 45.55^{a}	[51]	Holstein and Simmental/Germany
	47^{a}	39.2^{b}	[52]	USA
	35.3^{a}	38.4^{b}	[55]	Argentina
	48.4^{ab} to 49.9^{a}	44.7^{b}	[49]	Different breeds marketed/Brazil
			CHICKEN	
	35.8^{a}	37.89^{b}	[43]	Chicken breasts harvested at 81 days
	34.5^{a}	36.18^{b}		Chicken drumsticks harvested at 81 days
	38.8 to 41.2	39.9 to 42.31	[44]	Chilled or frozen chicken breasts/Scotland
	24.60^{a}	27,46^{b}	[63]	Australia
	24	24,3	[25]	Experimental study reared organic chicken
Poli unsaturated fatty acids (% of total fatty acids)			**BEEF**	
	7.4^{a} to 9.7^{a}	9.07^{b} to 14.3^{b}	[51]	Holstein and Simmental Beef/Germany
	2.7 ± 0.25	3.4 ± 0.19	[52]	USA
	7.1^{a} to 9.3^{b}	7.95^{a,b}	[55]	Argentina
	5.2 to 6.6^{a}	9.54^{b}	[49]	Different breeds marketed/Brazil
			CHICKEN	
	31.15^{a}	32.38^{a}	[43]	Chicken breasts harvested at 81 days
	27.55^{a}	32.13^{b}		Chicken drumsticks harvested at 81 days
	24.9 to 27.12^{a}	31.9 to 33.5^{b}	[44]	Chilled or frozen chicken breasts/Scotland
	32.28^{a}	23.72^{b}	[63]	Australia
	32.2	33	[59]	Chicken breast from experimental study
n-3 fatty acids (% of total fatty acids)			**BEEF**	
	0.6 to1.4^{a}	2.2 to 5.5^{b}	[54]	Holstein and Simmental/Germany
	0.96 to 0.9^{a}	3.25 to 4.71^{b}	[51]	Holstein and Simmental/Germany
	0.19^{a}	1.07^{b}	[52]	USA
	1.97^{a}	10.41^{b}	[56]	Beef from grass-fed and confined animal/Alantejo PT
	0.86^{a}	2.95^{b}	[55]	Argentina
	1.2 to 1.5	2.2	[49]	Different breeds marketed/Brazil
			CHICKEN	
	4.0^{a}	5.12^{b}	[43]	Chicken breasts harvested at 81 days
	3.12^{a}	4.73^{b}		Chicken drumsticks harvested at 81 days
	4.3 to 4.9^{a}	3.05 to 3.15^{b}	[44]	Chilled or frozen chicken breasts/Scotland
	1,45^{a}	1,97^{b}	[63]	Australia
	0.61	0.68	[59]	Chicken breast from experimental study
Conjugated fatty acids CLA (% of total fatty acids)			**BEEF**	
	0.52 to 0.56	0.55 to 0.6	[54]	Holstein and Simmental /Germany
	0.72 to 0.75^{a}	0.87 to 0.84^{b}	[51]	Holstein and Simmental/Germany
	0.6^{a}	1.03^{b}	[52]	USA
	0.26^{a}	0.51^{b}	[56]	Beef from grass-fed and confined animal/Alantejo PT
	0.31^{a}	0.72^{b}	[55]	Argentina
	0.87^{a}-1.1^{b}	1.48^{b}	[49]	Different breeds marketed/Brazil

* Meat obtained from animals certified as organic or animals raised on systems similar to organic, i.e. just on pasture

^{a,b} Different letters indicate statistical differences within studies

Similarly, micronutrients have rarely been evaluated. In the comparison of the composition of organic and non-organic meat products Srednicka-Tober et al. [29] and Castellini et al. [43] concluded that the evidence is too weak to claim mineral content is different in organic meat. Lower selenium and copper [29], equal iron [11,43] and cadmium [11] were suggested in organic meat.

Conclusions and Considerations

The data about the concentration of nutrients in animal source foods produced under organic system has shown that the nutritional value is uncertain compared to the non-organic products. Although some nutrients have been quantified as greater in quantity in organic food, other ones showed no changes or lower concentrations. According to several studies, the changing composition depends either on the animal food source and/or animal breed. The main changes analysed concern total and profile lipid, and few minerals and vitamins.

For organic meat cattle and organic dairy products, the PUFA, w-3 fatty acid and CLA are higher in quantity, according to the majority of researchers. Therefore, the lipid profile suggests that organic animal food is healthier than conventional one, due to bioactive compounds such as

CLA and w-3 PUFA series. The changing lipid in beef and milk could be associated with reduced risk of chronic diseases. For eggs or chicken, the results are not conclusive.

The lower concentration of SFA and higher w-3 PUFA can designate lower thrombogenicity index to organic meat (according to an estimative of Sredinicka-Tober et al. [29] from several data sources), and reduced risk of cardiovascular diseases. However, it should be pointed out that the beneficial effect to reduced cardiovascular diseases risk should be validated in human dietary interventions or even in cohort studies [29,61].

Extensive and recent systematic reviews and meta-analyses of published data have shown that human observational studies have demonstrated that an organic food intake is associated with a lower risk of childhood allergy, eczema, and pre-eclampsia in mothers. The data concerning the reduction of cancer, lower overweight or obesity is inconclusive, but the researcher's advice that it is not possible to identify whether it is organic food or other lifestyle factors related to the preference for organic food that accounts for these associations [29,62].

This present study showed data on the nutritional composition of animal foods and in concordance to other authors, were found possible health benefits due to lipid profile. However, there are limitations in the results and general conclusions.

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