Market analysis of potentially cardioprotective foods in context of legal health and nutrition claims

Focus: meat, dairy and egg products

Florian Bratzke, Falk Ritschel, Richard Wache, Katrin Thamm, Julia Kühn, Christine Dawczynski, Claudia Wiacek, Gabriele I. Stangl, Peggy Braun, Stefan Lorkowski, Toni Meier

Abstract
As there has been an increase in nutrition-associated cardiovascular diseases in Germany, the present article considers the extent to which the German retail food market was penetrated in 2016 by healthier meat, dairy and egg products. Furthermore, a market potential analysis was performed based on mean domestic expenditure for these foods in families with cardiovascular patients or hypertension. Market penetration by foods of healthier composition is relatively low, corresponding to 1.9% for meat products and 1.6% for dairy and egg products. This is in stark contrast to the potential market share of 2.5–38%, with an annual sales volume of 1.5–15.4 billion €, depending on the assumptions or scenario – either a defensive scenario for cardiovascular patients or a more offensive scenario for hypertensives. Although the decisive factors in preventing cardiovascular disease are adherence to a healthy diet based on vegetables, fruit and fiber – as well as a healthy lifestyle –, reformulated foods can help patients to improve their nutrition. The following article shows that the market potential for such foods is far from exhausted.

Keywords: cardiovascular diseases, meat and sausage products, dairy and egg products, market analysis, nutriCARD

Introduction
Cardiovascular diseases are still much the most important causes of death in Germany. According to the 2015 mortality statistics, 356,600 deaths (39%) were due to cardiovascular diseases [1]. According to the International Study on Disease Burden, 44% of these were associated with nutrition [2]. Thus, healthier (cardiovascular) nutrition could have avoided about 157,000 premature deaths in 2015.

Causes, costs and prevention of cardiovascular diseases
There are many different causes of cardiovascular diseases (CVD) and these may be subdivided into variable factors (e.g. nutrition, tobacco consumption, lack of exercise) and fixed factors (age, gender, genetic predisposition) [3]. Most CVD are related to the magnitude of variable risk factors. The main risk factors are imbalanced nutrition and high blood pressure [4]. Although there was a continuous decrease in premature deaths from nutrition-associated CVD in Germany between 1990 and 2010 (from 213,000 to 145,000), the value rose again to 157,000 by 2015. This is explained by the following risk factors (in
order of decreasing importance: (i) inadequate consumption of vegetables and nuts, (ii) excessive consumption of salt, (iii) inadequate consumption of fruit, n-3 fatty acids and wholegrain cereals, and (iv) excessive consumption of sausage products [2]. On the basis of representative data from the study on health in Germany (DEGS1), it was calculated that approximately 24 million people aged 18–80 suffer from high blood pressure [5]. CVD also takes a leading position with respect to high treatment costs. In all, 14.5 % of direct disease costs are caused by CVD [6, 7]. This corresponds to a sum of approximately 37 billion € per year, and is increasing [6]. In 2008, just the excessive consumption of salt, sugar and saturated fats led to direct costs for the treatment of CVD of 7.7 billion € (5.1 billion from salt, 2.2 billion € from sugar and 0.4 billion € from the excessive consumption of saturated fats) [8].

There is inherent potential to improve nutritional habits, yet this can only be exploited if there are commercially available products that permit a cardioprotective nutrition. However, there have been virtually no scientific studies on the availability of cardioprotective foods – either for Germany or for the rest of Europe. This particularly applies to surveys within the context of the Competence Cluster for Nutrition and Cardiovascular Health (nutriCARD) Halle-Jena-Leipzig, in order to support the successful market launch of cardioprotective foods.

Methods

Study scope

The present study focusses on meat products (meat and sausage products), as well as dairy and egg products, with potentially cardioprotective ingredients, as novel product developments within the competence cluster nutriCARD concentrate on these food groups. Moreover, these food groups were selected – rather than vegetables, pulses, fruit, or wholegrain products – as they contain problematical ingredients (saturated fatty acids, salt, sugar, etc.), which can raise the cardiovascular risk.

Reformulation can replace these ingredients with cardioprotective ingredients (n-3 fatty acids, fiber, plant protein, etc.), but without impairing the sensory quality of the products. Another reason for the focus of this study is that – according to the 2013 Nutrition Report of the German Nutrition Society (DGE; \( N_{men} = 6,160, N_{women} = 7,593 \)), consumption of “meat and sausage products” (men: 81 g/day, women 42 g/day), “dairy products” (men: 90 g/day, women: 98 g/day), eggs (men: 12 g/day, women 10 g/day) and butter (men: 14 g/day, women 8 g/day) are the principle elements of daily nutrition in Germany. This is the reason that fat ingestion corresponds to 35.5 % of energy (E%) in

Potentially cardioprotective meat products

- All meat and sausage products (including meat substitutes) which include a health and/or nutrition claim associated with cardiovascular protection and/or ingredients with potential cardioprotective activity

Potentially cardioprotective dairy and egg products

- All dairy and egg products (including substitute products) which include a health and/or nutrition claim associated with cardiovascular protection and/or ingredients with potential cardioprotective activity

Tab. 1: Systematization of the ranges in the retail survey
In order to determine the extent of the availability of cardioprotective products in the food segments covered in this study, a comprehensive on-site survey was carried out in 11 food retailers in the city Halle/Saale (Germany) (Figure 1) over a period of 2 weeks (09.–23.05.2016). Health food shops, wholefood shops, reform houses, etc. were not included. The classification of the cardioprotective products covered in this study is based on an ex-ante systematization in accordance with the following food categories (Table 1).

Potentially cardioprotective foods are defined as products that support a healthy heart or the health of the cardiovascular system. In this study, they are defined as all foods that have been demonstrated to contribute to the prevention of CVD due to the ingredients in their list of ingredients and/or a corresponding nutrition and/or health claim. At this, the study was orientated towards the authorized nutrition and health claims of Art. 13(1) and Art. 14(1)(a) [12–15] of the Health Claims Regulation, which suggest that the following substances are of relevance for cardioprotective health: fiber, B vitamins, potassium, magnesium, sodium chloride (reduction), n-3 fatty acids, oils containing n-3 fatty acids, plant sterols, and walnuts. The approved health claims of the American Food and Drug Administration (FDA) for legumes (peas and beans) and other nuts (besides walnuts) were also considered when these were relevant in terms of cardiovascular health.

<table>
<thead>
<tr>
<th>Potentially cardioprotective ingredients or nutrients</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>fiber</td>
<td>beta-glucans, chitosan, pectin, glucomannan, guar gum, hydroxypropylmethylcellulose</td>
</tr>
<tr>
<td>components containing fiber on the basis of</td>
<td>oat, barley</td>
</tr>
<tr>
<td>B-vitamins</td>
<td>vitamin B&lt;sub&gt;1&lt;/sub&gt; (thiamine), vitamin B&lt;sub&gt;2&lt;/sub&gt; (riboflavin), vitamin B&lt;sub&gt;3&lt;/sub&gt; (pyridoxine), vitamin B&lt;sub&gt;4&lt;/sub&gt; (folic acid), vitamin B&lt;sub&gt;5&lt;/sub&gt; (coenzyme A), vitamin B&lt;sub&gt;6&lt;/sub&gt; (pyridoxine), vitamin B&lt;sub&gt;7&lt;/sub&gt; (biotin), vitamin B&lt;sub&gt;9&lt;/sub&gt; (folate), vitamin B&lt;sub&gt;12&lt;/sub&gt; (cyanocobalamin)</td>
</tr>
<tr>
<td>minerals</td>
<td>potassium, magnesium</td>
</tr>
<tr>
<td>salt (NaCl) (reduction)</td>
<td>magnesium</td>
</tr>
<tr>
<td>n-3 fatty acids and oils containing n-3 fatty acids</td>
<td>alpha-linolenic acid, eicosapentaenoic acid, docosahexaenoic acid, rapeseed oil</td>
</tr>
<tr>
<td>phytosterols, phytosterol esters, phytostanols and phytostanol esters</td>
<td>EFSA [55–57]</td>
</tr>
<tr>
<td>walnuts</td>
<td>EFSA [58]</td>
</tr>
<tr>
<td>other nuts</td>
<td>FDA [45]</td>
</tr>
</tbody>
</table>

Tab. 2: Cardioprotective ingredients and/or nutrients considered in the market analysis

EFSA = European Food Safety Authority; FDA = Food and Drug Administration

Model to estimate the market volume of cardioprotective foods

To quantify the market potential, a linear model was developed to calculate the financial market volume for cardioprotective meat products, as well as dairy and egg products. The model set-up can be summarized in four steps which are analogous to the following questions.

1. For which sections of the German population are cardioprotective foods of relevance?

The section of the population rele-
vant to the consumption of more cardioprotective foods was calculated from the inpatient morbidity rate (MR) for CVD and the hypertension statistics for 2013. Because of the quantitative differences between the two values, this implies either a defensive scenario (CVD-MR, Figure 2) or an offensive scenario (hypertensives, Figure 3). In analogy to the procedure in the German Heart Report, the calculation was based on the following ICD-10 codes: ischemic heart diseases (I20–25), chronic rheumatic heart diseases (I05–09), other heart diseases (I34–39, I44–50), and congenital malformations of the circulatory system (Q20–28) [16].

2. What is the available income of the relevant section of the population?

The available income is determined on the basis of the last income and consumer sample (ICS; Einkommens- und Verbrauchsstichprobe [EVS]) of the Federal Statistical Office for 2013. This uses the statistics for the expenditure of private households on food, drinks and tobacco products and also includes the income data for different age groups in a household [17]. As different people can live in a household, the ICS assigns the age category in accordance with the age of the principle source of income. In a household of several people, an individual (aged at least 18) counts as the principle source of income when he or she contributes the greatest sum to the net income of the household [17].

Fig. 2: Inpatient morbidity rate (full inpatients per 100,000 inhabitants) for CVD in Germany in 2013 by age group (own calculation and depiction [16])

Fig. 3: Number of hypertensives (adult) in Germany by age group (own calculation and depiction [16])

1 The inpatient or stationary MR is a parameter to measure the demands on hospitals and gives the number of full in-patients per 100,000 inhabitants.
3. What mean fraction of their income does the relevant section of the population spend on food?

Calculation of the food expenses was also based on the ICS database. The procedure was also analogous to that used to determine the available income. The calculation of the available funds was based on expenses for the private consumption of food and alcohol-free beverages in 2013.

4. How much on average does the relevant section of the population spend on foods within the categories examined?

In the last step, all information was combined and used to calculate the market volume for cardioprotective foods. For this purpose, the fractional consumption of the available income was calculated that was spent by individuals in Germany with cardiovascular disease (CVD-MR) or hypertension on meat, and dairy and egg products.

Results

Cardioprotective meat products in retail

For all the retailers taken together, a total of 6,281 meat products were counted (including double counts). In accordance with the above classification, 118 of these were classified as potentially cardioprotective (including double counts). Without double counts, 83 items were identified. However, the calculation of the total market penetration must include double counts in different retailers. Market penetration was then calculated as 1.9%, with major fluctuations between the retailers (from 0–5.7%).

Ingredients and manufacturers

Evaluation of the potentially cardioprotective ingredients showed that rapeseed oil was found in 58% of products, peas and beans (pulses) and proteins derived from pulses in 51% and n-3 fatty acids (not classified more closely) in 7% of the products. Information on product manufacturers was also evaluated for the survey. The range of potentially cardioprotective meat products was headed by Rügenwalder Mühle (Carl Müller GmbH and Co. KG), which contributed a total of 14% to the identified product range. Second was Vello GmbH with 12%, followed by Tivall Europe B.V. with 11%.

Health and nutrition claims

None of the products classified as potentially cardioprotective bore an approved health-related claim (health claim). In contrast, a total of 41% meat products (34 of 83) bore a nutrition claim (Figure 4a).

Cardioprotective dairy and egg products in retail

Within the range of dairy and egg products, a total of 12,417 products were counted in all the food retailers (including double counts). 198 of these products were classified as po-
tentially cardioprotective (without double counts 106), giving a mean market penetration of 1.6 % for all food retailers (range: 0.6–5.7 %).

Ingredients and manufacturers
As regards to the ingredients of the potentially cardioprotective foods, it was found that 41 % of the products contain B vitamins and 40 % n-3 fatty acids. The third place was occupied by pulses which were given on 26 % of the product packages. A total of 17 % of the identified articles were manufactured by the firm WhiteWave Foods. The second place was taken by the company Friesland Campina Cheese GmbH with 8.5 % and the third place by Alnatura Produktions- und Handels GmbH with 7.5 % of the articles found.

Health and nutrition claims
Health-related information in accordance with the positive list of Art. 13(1) and Art. 14(1)(a) of the Health Claims Regulation was found for 11 % (12 of 106) of the dairy and egg products classified as cardioprotective (Health Claim). 39 % of these products (41 of 106) exhibited nutrition-related information (nutrition claim) (Figure 4b).

Market estimate I (defensive scenario: CVD-MR)
In 2013, there were approximately 1.6 million people in Germany who suffered from CVD in accordance with the morbidity rate. This corresponds to approximately 951,000 households which spent a mean of 270 € per month on food and non-alcoholic beverages. Thus, the potential monetary expenditure for food and non-alcoholic beverages is ca. 3.1 billion € for the section of the population who suffer from CVD.

<table>
<thead>
<tr>
<th></th>
<th>meat products</th>
<th>dairy and egg products</th>
</tr>
</thead>
<tbody>
<tr>
<td>total expenditures for the whole of Germany (all households: 39.3 million)</td>
<td>23.6 billion €</td>
<td>17.5 billion €</td>
</tr>
<tr>
<td>market potential of cardioprotective foods:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>defensive estimation scenario (based on 950,000 households with CVD patients)</td>
<td>600.5 Mio. €</td>
<td>444.4 Mio. €</td>
</tr>
<tr>
<td>offensive estimation scenario (based on 13.4 million hypertension households)</td>
<td>8.9 billion €</td>
<td>6.5 billion €</td>
</tr>
<tr>
<td>potential market share of cardioprotective foods (observed market share)</td>
<td>2.5–37.7 %</td>
<td>2.5–37.1 %</td>
</tr>
</tbody>
</table>

Tab. 3: Potential market for cardioprotective meat, dairy and egg products in Germany in food retail in 2013
CVD = cardiovascular diseases

Market estimate II (offensive scenario: hypertensives)
In 2013, the number of adult hypertensives was approximately 24 million, corresponding to approximately 13.4 million hypertension households, each of which spent a mean of 283 € per month on food and non-alcoholic beverages. Thus, for the section of the population suffering from hypertension, the potential monthly expenditure for food and non-alcoholic beverages is approximately 45.5 billion €.

Estimate of the monetary expenditure on meat products
In hypertension households, 19.5 % of the expenditure for foods and non-alcoholic beverages is used for the consumption of meat products. Relative to the calculated monetary expenditure for food and non-alcoholic beverages, this gives an annual expenditure for cardioprotective meat products of approximately 8.85 billion €, or a monthly expenditure of 55.10 € per hypertension household (Table 3).

Estimate of the monetary expenditure on dairy and egg products
In hypertension households, 14.4 % of the expenditure for foods and non-alcoholic beverages is used for the consumption of dairy and egg products. Relative to the calculated monetary expenditure for food and non-alcoholic beverages, this corresponds to a market potential of approximately 6.5 billion € per year for cardioprotective dairy and egg products. This means that 40.77 € per month is potentially available to each hypertension household (Table 3).

Discussion
The present study is the first survey of the market penetration of potentially cardioprotective meat, dairy and egg products in Germany (region: Halle/Saale) for 2016. In ad-
dation, a market analysis was performed to determine the potential sales of these foods. There was a vast discrepancy between the actual market penetration of the range (0–5.7%) and the potential market share of these ranges of products (depending on the scenario of estimation 2.5–38%), so that cardioprotective foods clearly possess great potential. As product listings in retail and ultimately purchasing decisions are influenced by a series of factors, it may be asked which specific individual measures might most efficiently increase the demand, sales and consumption of cardioprotective foods. Various relevant enhancing and inhibitory factors have been discussed at the marketing and regulatory levels (tax increases or decreases, agreement on mandatory targets, certification systems, etc.). However, it would be beyond the scope of the present article to submit these to a systematic evaluation (cf. [18–20]). At the end of 2016, the Federal Ministry of Food and Agriculture formulated the following very promising objective, “in collaboration with the food industry and science, to take specific steps, particularly to reduce the contents of salts, saturated fats and sugar [in food]” [21]. However, the regulatory environment tends to make it difficult for manufacturers to be innovative, as it now takes a great deal of time and money to extend the existing positive list in accordance with the Health Claims Regulation by new claims, or to qualify the manufacturer’s own products with health or nutrition claims [22]. As Brandenburger and Biringer [23] show, this is particularly the case for small and middle-sized companies. Moreover, there is scientific dispute about the extent to which explicit health claims can enhance sales [24–28]. From the aspect of public consumer and health protection, current regulations of the European Food Safety Authority (EFSA) do not go far enough in allowing consumers to implement expedient consumption of food that is better for cardiovascular health. It thus remains to be seen to what extent the current regulations on health and nutrition claims can be developed further in the coming years.

Limitations
The reliability of the present study is limited, as the calculation of the market penetration was solely based on a cross-section of food retailers in the city Halle/Saale during a two-week period in 2016. Moreover, it was restricted to meat, and dairy and egg products. Other groups of food with high potential cardioprotective activity (vegetables, fruits, wholegrain products, etc.) were mentioned in the introduction, but were not further considered in the study.

In addition, the calculation of the market potential was based on assumptions which were essential to the quantification of the monetary market volume. Firstly, this estimate is based on the assumption that all members of the identified households with CVD patients or hypertensives exhibited the corresponding clinical pictures. A more precise, member-specific assessment is not feasible, as the ICS collates data solely on household level. Secondly, it had to be assumed that all identified households covered their supplies of meat, dairy and egg products through food retailers to the same extent. We did not consider possible increases of cardioprotective foods in external markets (through wholesalers) or through direct marketing. We also failed to consider cost and price effects (readiness to pay higher prices or price elasticity, added costs from reformulation or labelling, etc.), which should be considered in the development of new products. However, a consumer acceptance study performed within the competence cluster nutriCARD has shown that – depending on socioeconomic factors – consumers are prepared to pay about 20% higher prices for cardioprotective products (acceptance of higher prices: sausage products: 19–22%, egg products: 21–24%) [29].

Conclusion
As diet-associated CVD are gradually rising, the supply of cardioprotective foods in food retailers should be gradually increased. The currently marginal market penetration of these foods should be regarded as an opportunity to extend product reformulation, product diversification and to address new consumer groups. In parallel, these measures should be embedded in tailor-made communication strategies to inform customers about the pros/cons of cardioprotective foods in context of a balanced nutrition.

Support
This study was conducted within the Competence Cluster for Nutrition and Cardiovascular Health (nutriCARD) Halle-Jena-Leipzig and supported by the Federal Ministry of Education and Research (BMBF) (Support Reference 01EA1411C).

Conflict of Interest
The authors declare no conflict of interest.

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References
[18–20]
18. EFSA (2009) Scientific opinion on the substantiation of health claims related to beta glucans and maintenance of normal blood cholesterol concentrations (ID 754, 755, 757, 801, 1465, 2934) and maintenance or achievement of a normal body weight (ID 820, 823) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 7: 1254
blood cholesterol and reduced risk of (coronary) heart disease pursuant to Article 14 of Regulation (EC) No 1924/2006. EFSA Journal 9: 2471

34. EFSA (2011) Scientific opinion [...] related to chitosan and reduction in body weight (ID 679, 1499), maintenance of normal blood LDL-cholesterol concentrations (ID 4663), reduction of intestinal transit time (ID 4664) and reduction of inflammation (ID 1985) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 9: 2214

35. EFSA (2010) Scientific opinion [...] related to pectins and reduction of post-prandial glycemic responses (ID 786), maintenance of normal blood cholesterol concentrations (ID 818) and increase in satiety leading to a reduction in energy intake (ID 4692) pursuant to Article 13 (1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1747


37. EFSA (2010) Scientific opinion [...] related to guar gum and maintenance of normal blood glucose concentrations (ID 794), increase in satiety (ID 795) and maintenance of normal blood cholesterol concentrations (ID 808) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1464

38. EFSA (2010) Scientific opinion [...] related to hydroxypropyl methylcellulose (HPMC) and maintenance of normal bowel function (ID 812), reduction of post-prandial glycemic responses (ID 814), maintenance of normal blood cholesterol concentrations (ID 815) and increase in satiety leading to a reduction in energy intake (ID 2933) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 7: 1739

39. EFSA (2009) Scientific [...] related to thiamine and energy-yielding metabolism (ID 21, 24, 28), cardiac function (ID 20), function of the nervous system (ID 22, 27), maintenance of bone (ID 25), maintenance of teeth (ID 25), maintenance of hair (ID 25), maintenance of nails (ID 25), maintenance of skin (ID 25) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 7: 1222

40. EFSA (2010) Scientific opinion [...] related to riboflavin (vitamin B2) and contribution to normal energy-yielding metabolism (ID 29, 35, 36, 42), contribution to normal metabolism of iron (ID 30, 37), maintenance of normal skin and mucous membranes (ID 31, 33), contribution to normal psychological functions (ID 32), maintenance of normal bone (ID 33), maintenance of normal teeth (ID 33), maintenance of normal hair (ID 33), maintenance of normal nails (ID 33), maintenance of normal vision (ID 39), maintenance of normal red blood cells (ID 40), reduction of tiredness and fatigue (ID 41), protection of DNA, proteins and lipids from oxidative damage (ID 207), and maintenance of the normal function of the nervous system (ID 213) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1814

41. EFSA (2010) Scientific opinion [...] related to vitamin B6 and contribution to normal homocysteine metabolism (ID 73, 76, 199), maintenance of normal bone (ID 74), maintenance of normal teeth (ID 74), maintenance of normal hair (ID 74), maintenance of normal skin (ID 74), maintenance of normal nails (ID 74), contribution to normal energy-yielding metabolism (ID 75, 214), contribution to normal psychological functions (ID 77), reduction of tiredness and fatigue (ID 78), and contribution to normal cytokine synthesis (ID 4283) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1759

42. EFSA (2009) Scientific opinion [...] related to folate and blood formation (ID 79), homocysteine metabolism (ID 80), energy-yielding metabolism (ID 90), function of the immune system (ID 91), function of blood vessels (ID 94, 175, 192), cell division (ID 193), and maternal tissue growth during pregnancy (ID 2882) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 7: 1213

43. EFSA (2010) Scientific opinion [...] related to vitamin B12 and contribution to normal neuro- psychological and psychological functions (ID 95, 97, 98, 100, 102, 109), contribution to normal homocysteine metabolism (ID 96, 103, 106), maintenance of normal bone (ID 104), maintenance of normal teeth (ID 104), maintenance of normal hair (ID 104), maintenance of normal skin (ID 104), maintenance of normal nails (ID 104), reduction of tiredness and fatigue (ID 108), and cell division (ID 212) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1756


46. EFSA (2010) Scientific opinion [...] related to potassium and maintenance of normal muscular and neurological function (ID 320, 386) and maintenance of normal blood pressure (ID 321) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1469

47. EFSA (2009) Scientific opinion [...] related to magnesium and electrolyte balance (ID 238), energy-yielding metabolism (ID 240, 247, 248), neurotransmission and muscle contraction including heart muscle (ID 241, 242), cell division (ID 365), maintenance of bone (ID 239), maintenance of teeth (ID 239), blood coagulation (ID 357) and protein synthesis (ID 364) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 7: 1216

48. EFSA (2011) Scientific opinion [...] related to foods with reduced amounts of sodium and maintenance of normal blood pressure (ID 336, 705, 1148, 1178, 1185, 1420) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 9: 2237

49. EFSA (2009) Scientific opinion [...] related to alpha linolenic acid and maintenance of normal blood cholesterol concentrations (ID 493) and maintenance of normal blood pressure (ID 625) pursuant to Article 13 (1) of Regulation (EC) No 1924/2006. EFSA Journal 7: 1252

50. EFSA (2009) Scientific opinion [...] related to EPA, DHA, DPA and maintenance of normal blood pressure (ID 502), maintenance of normal HDL-cholesterol concentrations (ID 515), maintenance of normal (fasting) blood concentrations of triglycerides (ID 517), maintenance of normal LDL-cholesterol concentrations (ID 528, 698) and maintenance of joint (ID 503, 505, 507, 511, 518, 524, 526, 535, 537) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 7: 1267

51. EFSA (2010) Scientific opinion [...] claims related to eicosapentaenoic acid (EPA),
docosahexaenoic acid (DHA), docosapentaenoic acid (DPA) and maintenance of normal cardiac function (ID 504, 506, 516, 527, 538, 703, 1128, 1317, 1324, 1325), maintenance of normal blood glucose concentrations (ID 566), maintenance of normal blood pressure (ID 506, 516, 703, 1317, 1324), maintenance of normal blood HDL-cholesterol concentrations (ID 506), maintenance of normal (fasting) blood concentrations of triglycerides (ID 506, 527, 538, 1317, 1324, 1325), maintenance of normal blood LDL-cholesterol concentrations (ID 527, 538, 1317, 1325, 4689), protection of the skin from photo-oxidative (UV-induced) damage (ID 530), improved absorption of EPA and DHA (ID 522, 523), contribution to the normal function of the immune system by decreasing the levels of eicosanoids, arachidonic acid-derived mediators and pro-inflammatory cytokines (ID 520, 2914), and “immunomodulating agent” (4690) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1796

52. EFSA (2011) Scientific opinion […] related to docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA) and brain, eye and nerve development (ID 501, 513, 540), maintenance of normal brain function (ID 497, 501, 510, 513, 519, 521, 534, 540, 688, 1323, 1360, 4294), maintenance of normal vision (ID 508, 510, 513, 519, 529, 540, 688, 2905, 4294), maintenance of normal cardiac function (ID 510, 688, 1360), “maternal health; pregnancy and nursing” (ID 514), “to fulfill increased omega-3 fatty acids need during pregnancy” (ID 539), “skin and digestive tract epithelial cells maintenance” (ID 525), enhancement of mood (ID 536), “membranes cell structure” (ID 4295), “anti-inflammatory action” (ID 4688) and maintenance of normal blood LDL-cholesterol concentrations (ID 4719) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 9: 2078

53. EFSA (2010) Scientific opinion […] related to docosahexaenoic acid (DHA) and maintenance of normal (fasting) blood concentrations of triglycerides (ID 533, 691, 3150), protection of blood lipids from oxidative damage (ID 630), contribution to the maintenance or achievement of a normal body weight (ID 629), brain, eye and nerve development (ID 627, 689, 704, 742, 3148, 3151), maintenance of normal brain function (ID 565, 626, 631, 689, 690, 704, 742, 3148, 3151), maintenance of normal vision (ID 627, 632, 743, 3149) and maintenance of normal spermatozoa motility (ID 628) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 8: 1734

54. EFSA (2011) Scientific opinion […] related to rapeseed oil and maintenance of normal blood LDL-cholesterol concentrations (ID 580, 581, 1408) and maintenance of normal blood HDL-cholesterol concentrations (ID 1408) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 9: 2068


57. EFSA (2009) Danacol® and blood cholesterol scientific substantiation of a health claim related to a low fat fermented milk product (Danacol®) enriched with plant sterols/stanols and lowering/reducing blood cholesterol and reduced risk of (coronary) heart disease pursuant to Article 14 of Regulation (EC) No 1924/2006. EFSA Journal 7: 1177

58. EFSA (2011) Scientific opinion [on the substantiation of a health claims] related to walnuts and maintenance of normal blood LDL-cholesterol concentrations (ID 1156, 1158) and improvement of endothelium-dependent vasodilation (ID 1155, 1157) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal 9: 2074

DOI: 10.4455/eu.2018.002