

# Guidelines for the New Nordic Diet

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## Abstract

**Objective:** Diet has a significant impact on health, and ensuring that the population eats a healthy diet remains a public health challenge. Research is needed in order to improve the palatability of a healthy diet and make it attractive to the consumer. It has also been suggested that dietary recommendations should be tailored to regional conditions. The OPUS (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet) project investigates whether it is possible to develop a healthy New Nordic Diet (NND) that is palatable, environmentally friendly and based on foods originating from the Nordic region. The present paper describes the overall guidelines for the NND, developed and investigated in the multidisciplinary, 5-year OPUS research project. All guidelines are described in relation to the key principles: health, gastronomic potential and Nordic identity, and sustainability.

**Results:** The NND is described by the overall guidelines: (i) more calories from plant foods and fewer from meat; (ii) more foods from the sea and lakes; and (iii) more foods from the wild countryside. These overall guidelines result in a set of proposed dietary components which will be presented in a subsequent paper.

**Conclusions:** Both the guidelines and the diet are composed taking the potential health-promoting properties and Nordic identity of the NND into account, as well as concern for environmental issues and gastronomic potential.

**Keywords**  
Diet  
Health  
Nordic  
OPUS

Over the past two decades a New Nordic Cuisine has been developed in Scandinavia. The New Nordic Cuisine Manifesto<sup>†</sup> was formulated in 2003<sup>(1)</sup> and was adopted by the Nordic Council of Ministers as the ideology of the New Nordic Food programme in 2005<sup>(2)</sup>, with the aim of establishing Nordic cuisine as part of the gourmet world map. Restaurants and chefs focusing on Nordic food are now rated among the best in the world<sup>(3,4)</sup>, so foods from the Nordic region clearly have great gastronomic potential. As regionally produced foods they are also

potentially environmentally sustainable<sup>(1)</sup>, the hypothesis being that transport of food from production to consumer can be minimized by increased consumption of local produce, thus minimizing some of the negative effect on the environment. Stressing regionality, the use of seasonal produce and the use of foods from the wild countryside might also be of benefit to the environment. The New Nordic Cuisine therefore has real potential with regard to sustainability in the Nordic countries.

The palatability of foods is not always in harmony with their health-promoting qualities, as some of the nutritionally dense and less beneficial elements, especially fats, are important for flavour and mouthfeel<sup>(5)</sup>. A new diet needs to take health aspects into account, as diet plays a major role in the development of disease today<sup>(6)</sup>. In Denmark, as in the rest of the world, the prevalence of overweight and obesity among both children and adults has increased dramatically over the last 60 years<sup>(7,8)</sup>. Obesity increases the risk of a wide range of serious medical complications, including CVD, insulin resistance, type 2 diabetes, gallbladder disease, osteoarthritis, asthma and several cancers<sup>(9)</sup>. Promoting a healthy diet is therefore an important aspect of public health policies in many countries, and the recommendations for healthful eating are very similar across countries<sup>(10)</sup>.

<sup>†</sup> The aims of the New Nordic Cuisine are to: (i) express the purity, freshness, simplicity and ethics we wish to associate with our region; (ii) reflect the changing of the seasons in the meals we make; (iii) base our cooking on ingredients and produce whose characteristics are particularly excellent in our climates, landscapes and waters; (iv) combine the demand for good taste with modern knowledge of health and well-being; (v) promote Nordic products and the variety of Nordic producers, and spread the word about their underlying cultures; (vi) promote animal welfare and a sound production process in our seas, on our farmland and in the wild; (vii) develop potentially new applications of traditional Nordic food products; (viii) combine the best in Nordic cookery and culinary traditions with impulses from abroad; (ix) combine local self-sufficiency with regional sharing of high-quality products; and (x) join forces with consumer representatives, other cooking craftsmen, agriculture, the fishing, food, retail and wholesale industries, researchers, teachers, politicians and authorities on this project for the benefit and advantage of everyone in the Nordic countries<sup>(1)</sup>.

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Dietary recommendations have not been successful in reversing the obesity epidemic so far, and there are probably several reasons for this. Recent studies have shown that current dietary recommendations may not be effective for the control of body weight and the prevention of weight gain and obesity<sup>(11,12)</sup>. Furthermore, palatability and gastronomic potential are not taken into account in current dietary recommendations<sup>(13)</sup>. Nutrition experts are often confronted with unpalatability of the recommended diet. A Danish study found that lack of sufficient focus on the gastronomic properties of the recommended diet led to increased drop-out during a course of weight maintenance following a weight-loss programme in obese individuals<sup>(14)</sup>. In addition, it has been suggested that dietary recommendations should be more tailored to regional conditions<sup>(15)</sup>. Such regional tailoring may help to preserve cultural diversity in eating habits and contribute to more environmentally friendly consumption.

Both gastronomists and nutritionists are beginning to believe that there is a shared route to creating regional diets and an opportunity to develop a healthy diet that bridges gastronomy, health and sustainability. This forms the basis for the multidisciplinary, 5-year research project, OPUS (Optimal well-being, development and health for Danish children through a healthy New Nordic Diet), which aims to define and test a New Nordic Diet (NND). The hypothesis is that an optimal diet composition, based on healthy, palatable meals, may not only contribute to the prevention of excessive weight gain, obesity and other health disorders, but may also improve quality of life, learning ability, and mental and physical performance in children<sup>(16,17)</sup>.

The objective of the present paper is to describe the overall guidelines for the NND. All guidelines are described in relation to key principles: health, gastronomic potential and Nordic identity, and sustainability. The nutritional value and dietary composition of an NND for the Danish region will be elaborated and discussed in a subsequent paper.

### **Development of a New Nordic Diet**

The NND is developed on the basis of input from experts in the fields of human nutrition, gastronomy, environmental issues, food culture and history, and sensory science, and from experts with knowledge about children and their food habits and preferences. This forum was gathered at the initial OPUS congress held in June 2009 in Copenhagen, and some participants were subsequently selected to form advisory boards for the OPUS working groups. The 2009 congress and the subsequent work resulted in a report published in Danish in August 2010<sup>(18)</sup>.

OPUS is a Danish project and two intervention studies within the project are to be carried out in Denmark, so 'the NND' in this context is based on the Danish market

and food culture, with references to average dietary intake in the Danish population. The overall principles and guidelines can, however, easily be translated and applied to any country in the Nordic or Northern European region.

In the development of the NND the following principles have been crucial: (i) health; (ii) gastronomic potential and Nordic identity; and (iii) sustainability. These principles are central in the guidelines for the NND and are elaborated below.

### **Health**

A healthy diet should contribute to the prevention of weight gain, obesity, type 2 diabetes, CVD and cancer. But being healthy is more than just the absence of disease. In addition, a healthy diet should help maintain and improve general health, defined by WHO as a state of complete physical, mental and social well-being<sup>(19)</sup>. Health effects should be evaluated on the basis of evidence from randomized controlled trials and prospective cohort studies in human subjects. The NND is based on the existing scientific knowledge within health and nutrition. Dietary components with substantial evidence of health-promoting properties that are included in the National Food-based Dietary Guidelines (NFDG) are naturally included in the NND; e.g. fruits, vegetables, potatoes, whole grains, nuts, fish and shellfish<sup>(20)</sup>. The hypothesis is that being healthy is not only achieved by adding or refraining from specific nutrients, but more a condition we approach through what we actually choose to eat. Testing the hypothesis is a major aim of OPUS.

### **Gastronomic potential and Nordic identity**

Palatability is an important consideration in the development of the NND. The New Nordic Cuisine has gained tremendous respect throughout the world because of its gastronomically excellent meals based on Nordic foods. The NND is based on food with a Nordic identity and cultural heritage, i.e. foods produced in the Nordic countries and expressing the Nordic terroir. The term 'terroir' means the impact of multiple conditions such as soil, climate and microclimate, location and form of cultivation on the properties of a specific food. Terroir has been elaborated in other food cultures, but is still a relatively new term for the Nordic food culture. A potato is not just a potato. It can have a range of different flavours and textures, dependent on where and how it is grown. For example, the sandy soils and coastal climate of the Danish island of Samsø give potatoes grown there a distinct flavour. Other examples of produce often associated with the specific terroir in Denmark include carrots, apples, mutton, herrings, cheeses and smoked foods based on terroir-defined produce and special technology. Such produce are found in all countries, illustrating the common understanding of the concept. The Nordic terroir can be summarized as a cool climate

often leading to a slow growth rate, many hours of light during the summer and the opposite during the winter, limited differences in temperature from night to day, and a lot of coastal waters with large variations in salt content. The challenge is to identify the produce best suited to a particular terroir, and in particular any produce where its gastronomic properties are enhanced by local conditions. In the development of the NND we have been looking for foods which gain special gastronomic potential when grown in the Nordic region. The origin and historical time of entry to the local environment of the different kinds of produce do not necessarily determine whether a food can be part of the NND. The more important factor is the ability of the produce to thrive in the Nordic terroir with exceptional gastronomic properties as a result.

### **Sustainability**

Food production and preparation affect the environment in many ways, including effects on greenhouse gases, biodiversity, landscape, environmental toxins, etc.<sup>(21)</sup>. The impact is affected by consumer demand. The global population is growing rapidly and there is a need for food supply strategies for all regions that will ensure food security without jeopardizing the environment. Four simple considerations for sustainability were used in the formulation of the NND:

1. Focus on locally grown foods to minimize the transport of foodstuffs, thereby minimizing the negative impact of transportation on the environment.
2. Focus on foods from organic food production. The organic production principle is based primarily on consideration for nature and biodiversity, and it is an attempt to care for soil, biodiversity, quality, health and the welfare of nature, including plants, animals and humans. The current official organic labelling system in Denmark is a technical and legal guarantee that a food is grown without GM organisms, synthetic pesticides, inorganic fertilizers or other synthetic agents, and without the use of germicidal irradiation<sup>(22)</sup>. In addition, manufacturers of organic food products must comply with a clear set of rules regarding the use of additives. Ideally, all meals and dietary components in the NND should meet these basic criteria with a minimal use of additives. However, this would require that organic food production be fully established and integrated in society, but it is not yet fully developed and there are still many challenges to be resolved.
3. Focus on composing a proportion of the diet from foods sourced from the wild countryside, encouraging biodiversity and minimizing use of fertilizers and pesticides.
4. Focus on minimizing waste and utilizing all of every food purchased.

### **Guidelines for the New Nordic Diet**

The road from the overall concept of the New Nordic Cuisine to an NND for the general population involved generalization and popularization. This led to the formulation of three fundamental guidelines as the basis of the NND as compared with the current average Danish diet. These are: (i) more calories from plant foods and fewer from meat; (ii) more foods from the sea and lakes; and (iii) more foods from the wild countryside. In the following each of these guidelines is elaborated with respect to the overall principles mentioned previously: health, gastronomic potential and Nordic identity, and sustainability.

#### ***More calories from plant foods and fewer from meat***

Consumption of meat has almost doubled in the Nordic countries over the past 50 years, and meat intake in the Nordic population is among the highest in the world<sup>(23)</sup>. There is evidence that high protein intake can reduce the risk of several diseases, particularly among the large proportion of sedentary and slightly overweight individuals in the population<sup>(24,25)</sup>. However, meat is among the least environmentally friendly foods, so more environmentally friendly protein sources, with greater health benefits, are to be preferred<sup>(26)</sup>.

#### ***Health***

A lower intake of meat makes room for more legumes, vegetables, fruit, grains, potatoes, nuts, herbs, etc. in the daily diet, most of which have substantially better impacts on health. Studies have shown that a daily intake of 600 g or more of fruits and vegetables reduces the risk of CVD<sup>(27,28)</sup>, overweight and obesity<sup>(29)</sup> and probably certain cancers<sup>(30,31)</sup>. Studies on whole grains have found a significant inverse association between intake of whole grains and risk of CVD<sup>(32,33)</sup>, type 2 diabetes<sup>(34)</sup>, cancer<sup>(35)</sup> and weight gain or risk of obesity<sup>(36)</sup>. Starchy plant foods like potatoes are an important source of dietary fibre, vitamins B<sub>6</sub> and C, folate, Fe, K and Mg in the Danish diet<sup>(37)</sup>. A replacement of some of the meat we eat today with plant foods would lead to a reduction in the intake of saturated fat and increased intakes of unsaturated fats, dietary fibres, vitamins and minerals. Most plant foods are low in calories, making it possible to eat larger amounts while lowering the energy density of the diet and still satisfying the senses and satiety. A high intake of plant foods therefore has a natural place in a diet which, together with other lifestyle changes, can reduce the risk of weight gain, obesity and the development of several lifestyle diseases.

#### ***Gastronomic potential and Nordic identity***

Plant foods help in defining a regional kitchen. They provide colour and flavour variation in meals. Plant foods such as berries, cabbages, root vegetables, legumes, potatoes and herbs can maximize tastiness and help create

a clear Nordic identity while being a minor burden to the environment. They can form part of everyday meals all year around, and could be the basis of many Nordic meals. These plant foods thrive in the Nordic climate and there is a long tradition of cultivating and consuming them here<sup>(38,39)</sup>. Many plant foods have an as yet unexplored production potential in the Northern climate, including possibilities for cultivation across the seasonal calendar. The introduction of new or different varieties could prolong the growing season and increase the selection of plant foods grown in the Nordic countries. In the Middle Ages foods such as fresh herbs, legumes, cabbage and root vegetables played a major role in the Nordic diet, but their use has decreased significantly over recent decades and exotic dried spices, rice and pasta have partially taken their place<sup>(38,39)</sup>. Nordic plant foods have a large gastronomic potential and could very well be promoted to their former importance in our food culture.

#### *Sustainability*

The suggestion of reducing intake of meat should be seen in the light of the fact that the meat intake of the Nordic populations is among the highest in the world<sup>(23)</sup>. It has been estimated that the climate impact of the Danish diet alone could be reduced by approximately 30% compared with the current average Danish diet if the population were to consume a diet in accordance with the NFDG (less meat and more plant foods and fish)<sup>(20)</sup> and choose their foods with more consideration for the environment<sup>(40)</sup>. Meat is among the least environmentally friendly foods and a 30% reduction in meat intake for the Danish population would correspond to a reduction of 6.6 million tonnes of CO<sub>2</sub> equivalents per annum<sup>(40)</sup>. Plants such as cabbage, potatoes and root vegetables can easily be grown using organic farming methods in the Nordic countries. For example, compared with producing 1 kg of beef, fifty-seven times less greenhouse gases are emitted when producing 1 kg of potatoes<sup>(41)</sup>. In order to ensure adequate protein content in the diet while reducing meat intake, the NND includes larger amounts of alternative protein sources such as legumes and fish. In this way protein intake can be maintained and the environmental burden reduced.

#### *More foods from the sea and lakes*

The Nordic countries are surrounded by water, and high-quality fish and shellfish are abundant here. A large proportion of the Nordic fishing catch is currently exported, so there is good potential for increasing local consumption. Furthermore, the Nordic countries have vast amounts of seaweed, a source of nutrition that has mostly been overlooked in the Western world, except for a few Nordic regions where its use has been traditional. Fish and shellfish have a significant health-promoting potential, as does seaweed. However, there are some safety issues in the use of seaweed in the human diet that still remain to be clarified<sup>(42)</sup>. Increasing the proportion of freshwater and sea foods in the

diet has a large potential to improve health, provides variation in meals and can contribute as an environmentally friendly protein source in the NND.

#### *Health*

Fish and shellfish have a significant health-promoting potential. Studies have shown that *n*-3 fatty acids, present in significant amounts in fatty fish, may improve child brain development and help prevent heart disease and nervous disorders in adults<sup>(43)</sup>. In addition, fish and shellfish have high contents of valuable vitamins and minerals, including vitamin D, iodine and Se, which are difficult to find naturally in other foods. Low vitamin D status, especially during the winter, is relatively common in Denmark and can lead to osteoporosis<sup>(44)</sup>. Some studies also suggest that a high intake of Se is associated with a reduced risk of cancer<sup>(45)</sup>. Fish and shellfish contain high amounts of protein and an increased intake may help to prevent weight gain and obesity, type 2 diabetes, and sarcopenia in the elderly<sup>(46,47)</sup>. Different species of fish and shellfish contain different amounts of vitamins, minerals and fatty acids. The intake should therefore be alternated between fatty and lean species, and between catches from different origins (Atlantic, Baltic, fresh water, etc.) in order to get the full health benefits while minimizing risks of toxicity from pollution with organohalides and heavy metals.

Seaweed has high contents of essential minerals, protein, dietary fibre, vitamins (A, B, C, E) and essential fatty acids<sup>(48)</sup>. It also contains a range of bioactive compounds which may play a role in the prevention of CVD and possess certain antiviral and anticancer effects<sup>(49)</sup>. Seaweed is a relatively unknown food in Denmark and it deserves greater attention here. Exploration of variations between species and origin in nutrient composition, including evaluation of risks from relatively high content of iodine in some species, is warranted.

#### *Gastronomic potential and Nordic identity*

Catch Area 27 is the sea around Denmark and the Nordic countries, where the so-called arctic fish and shellfish are found. The Nordic countries are characterized by long coastlines, and several of the countries have a huge number of freshwater lakes, providing extensive access to large amounts of locally caught high-quality fish and shellfish with very distinctive flavours. The waters of the North Sea, Baltic Sea and the Bothnic Bay vary greatly in salinity and mineral content, making distinct terroirs for fish such as herring and salmon, which vary in texture and taste according to locality. The majority of the fish caught is currently exported. A greater knowledge of the richness of these foods from the seas, coastal waters and lakes could encourage increased local use and contribute to a more distinct Nordic identity of our meals. The same considerations apply to seaweed. Historically, seaweed was part of the poor man's diet along most Nordic coastlines<sup>(48)</sup>. Seaweed has a broad application in the



kitchen and can be eaten raw, boiled, baked, roasted, puréed, dried, granulated or deep fried. The taste and texture of seaweed are very dependent on how it is treated. Seaweed can have a broad palette of flavours ranging from a strong and robust taste to sweet or salty, mild or spicy sea-notes. A supply chain would need to be established before Nordic seaweed is commonly available as a food.

### *Sustainability*

It is important to consider the environment when proposing an increased consumption of fish and shellfish. Raising fish in fish farms is less environmentally friendly than catching fish in the wild<sup>(50)</sup>. Farmed fish are often fed partly on vegetable oils because there is not enough trash fish for feed, resulting in a reduced amount of healthy fish oils in the fish sold for consumption as a consequence<sup>(51,52)</sup>. The NND therefore focuses on wild-living species, which can be fished in a sustainable manner. One way to ensure a sustainable fishery is to choose fish that are MSC (Marine Stewardship Council) labelled, where the following criteria must be met: (i) the stock of fish should be sustainably fished, or evidently on its way to becoming so; (ii) fishing must not damage the ecosystem or marine environment; and (iii) fishing should be managed effectively so that sustainability and the ecosystem are guaranteed<sup>(53)</sup>.

There is a great potential for sustainable harvesting of seaweed, both wild and cultivated, in large quantities in the Nordic seas. It is also possible to create aquacultures where, together with clams and fish, seaweed can be cultivated in sustainable ecosystems<sup>(48)</sup>.

### ***More foods from the wild countryside***

In the Nordic countries the population has reasonable access to large quantities of foods from the wild countryside, e.g. plants, mushrooms, berries, fruits and meat. Foods foraged from the wild are interesting because of their possible health potential, their firm gastronomic potential and their minimal impact on the environment. They can be collected by the individual or systematic gathering and distribution could be established, making them available for all. In this way some of the greatest gastronomic experiences could be made accessible for all. Foods from the wild countryside differ from country to country and are an important part of the identity of a regional cuisine.

### *Health*

It seems that wild plants contain higher amounts of vitamins, minerals, secondary plant metabolites and *n*-3 fatty acids than conventionally grown plants<sup>(54)</sup>. It has been found that wild plants have higher contents of vitamin C, vitamin E, phenols and other compounds that increase the antioxidant level in plants<sup>(54)</sup>. Purslane and white goosefoot, usually regarded as weeds, have been described as two of the most nutritious plants in the world. Purslane contains large amounts of  $\alpha$ -linolenic acid, while white

goosefoot is rich in protein, vitamin A, Ca, P and K<sup>(55)</sup>. However, some caution should be exercised before including wild plants in the diet as many have a high content of bioactive components, the composition of some is still unknown and or not well understood, and some can be toxic if ingested in large quantities.

It is not only plant foods from the wild that seem to have a health-promoting potential. Meat from wild animals and fowl generally contains less fat and has a healthier fatty acid composition, with less saturated fat and more polyunsaturated fat, than meat from commercially reared animals, kept inside with no access to pasture. Moreover, a significantly higher content of *n*-3 fatty acids has been found in meat from animals caught in the wild<sup>(56)</sup>. Access to game and fowls is limited in the Nordic region, but studies have shown that meat from domestic animals that graze in open pastures also has a healthier fatty acid composition, with less saturated fat and more polyunsaturated fat, than meat from animals reared indoors without access to herbs and grass<sup>(56,57)</sup>. The NND therefore focuses on game from the wild, but includes meat from free-range animals.

### *Gastronomic potential and Nordic identity*

Current dietary recommendations advise the population to eat a diet that satisfies the body's need for a wide range of nutrients and with a certain energy composition, while the importance of the individual's needs for pleasure and taste are not taken into consideration. A lean diet is often experienced as tiresome, without satisfying the need for pleasure, taste and sensory stimulation. The NND aims to include foods that bring taste and volume to a meal. Foods such as fresh herbs, wild plants and mushrooms are highly aromatic and can provide taste and volume to a meal containing less fat, helping to compensate for the deprivation some people might experience when exposed to a reduction of fat in the diet<sup>(58)</sup>.

Wild herbs, berries, etc. vary from region to region, depending on the local climate and soil conditions. Salt meadows, heath land and beech forests are examples of habitats which provide distinctive foods, each with a distinct taste and aroma. Meat from game shot in the wild is highly prized in gastronomy, because the animals have fed on wild plants that impart characteristics specific to the region to the meat. Although perhaps mostly on the symbolic and cultural level, game and wild plants play a role in the NND in that they display a maximum of diversity and local variation and at the same time differentiate Nordic cuisine from other food cultures.

### *Sustainability*

Fungi such as chanterelles and Portobello mushrooms, and plants such as nettles, ground elder, wild garlic, meadowsweet and goosefoot, can be gathered freely in season in the countryside by everyone. The mileage from soil to table can be reduced significantly when produce is collected from our own backyard. Wild plants and fungi

grow without fertilizers, pesticides or the expense of external energy, making a very small negative impact on the environment compared with conventional food production. However, there is a limit to how much food the population can gather from the wild before making a negative impact on the environment. Even so, it is estimated that only 2–4% of the berries growing wild in the Nordic region are collected and consumed by humans<sup>(59,60)</sup> and that only a limited part of the remaining 96–98% is consumed by birds and wild animals. The same can be assumed for many other plants and foods, so these could (and should) be exploited to a greater extent.

### Concluding remarks

The current paper presents the principles and guidelines behind the formulation of a healthy NND. These guidelines have been used to identify specific components for the NND and suggestions for intake. The resulting diet will be detailed in a subsequent publication. The diet is currently being tested in two intervention studies in the OPUS project, one in adults and one in schoolchildren. The NND is a prototype regional diet taking health, food culture, palatability and the environment into account. The principles and guidelines could be applied in any region, including any other specific region within the Nordic countries.

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C. Mithril shape the draft paper into its final form which was then approved with minor corrections by the other co-authors. *Acknowledgements:* The authors thank the Advisory Boards assisting OPUS Work Package 1 and the participants at the OPUS congress held in June 2009 in Copenhagen for their valuable input and help in the development of the NND.

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