Systematic Literature Review Protocol

Comparison of composition (*nutrients and other substances*) of organically and conventionally produced foods

Nutrition and Public Health Intervention Research Unit
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1. Research Question

Systematically to review and compare the composition (*nutrients and other substances*) of organically and conventionally produced foods.

2. LSHTM Review Team

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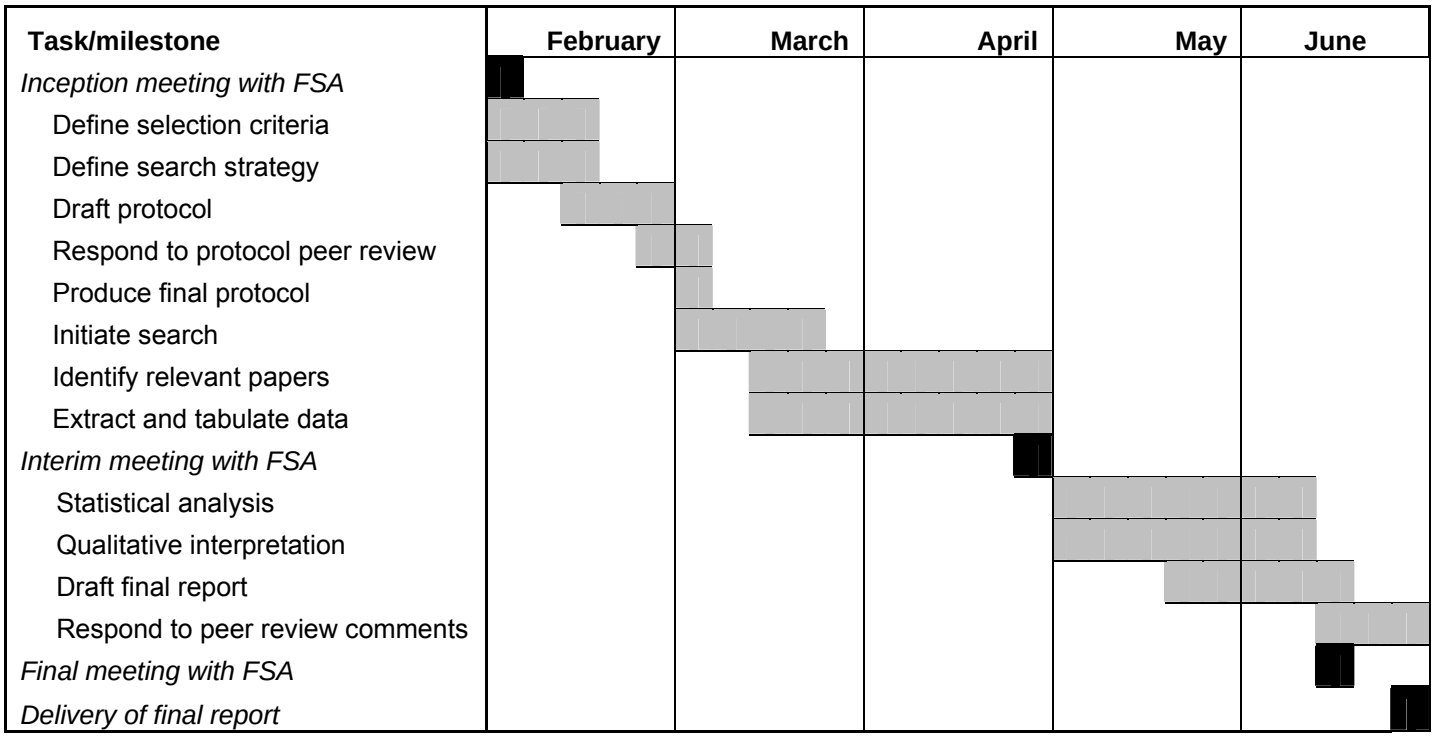
3. Expert Independent Review Panel

Dr. Julie Lovegrove PhD (University of Reading)

Professor Martin Wiseman MBBS FRCP FRCPath (World Cancer Research Fund)

4. Defined Timeline



5. Background

The global demand for organic food is rising. In 2007 the organic food market in the UK was estimated to be worth over £2 billion – an increase of 22% since 2005 [1]. The UK organic market is now the third largest in Europe after Germany and Italy. Increased sales have been linked, at least in part, to increased consumer confidence in the safety of organic foods, and their perceived benefits to human health and the environment [2].

Three reviews have been published over the past 10 years that compare nutritional quality of organic with conventional foods [3-5]. None of the reviews employed an explicitly systematic review methodology. Two of the reviews came to the conclusion that there were no consistent differences in nutrient content between organic and conventional foods [4, 5], while the third review reported that organic crops contained more vitamin C, iron, magnesium and phosphorus than conventional crops [3]. Little research has been conducted on the potential benefits of organic foods for human health, and there is no consistent underlying hypothesis for the mechanisms of action of any putative health benefits [2, 6].

Given the large and increasing demand for organic foods in the UK and elsewhere, an up-to-date objective independent statement on the nutrient and other nutritionally relevant substance composition of organic and conventionally produced foods is needed for both public policy and consumer advice. This review will focus only on nutrients and other nutritionally relevant substances (*nutrients and other substances*).

The process outlined below is based (with permission) on that used by some of the current review team for the recently published World Cancer Research Fund *Second Expert Report on Food, Nutrition, Physical Activity and the Prevention of Cancer* [7].

6. Conceptual Framework

The *nutrient and other substance* composition of crops, livestock and processed foods will vary depending on a wide range of factors. An understanding of these various factors is crucially important for the design and interpretation of research in this area, and it should also serve to identify critical gaps in our knowledge and thus the intrinsic limitations of any analysis. A proposed conceptual framework highlighting factors that contribute to the

variance in the estimates of *nutrient and other substance* content in crops, livestock and processed foods is presented in Annex 1.

7. Search Strategy

Search strategies have been developed with PubMed using Medical Subject Heading [MeSH] and title abstract [tiab] terms to identify relevant exposures (organic vs. conventional production methods) and outcomes (composition of nutrient and other substances) (see Annex 2).

7.1 Databases

Multi-database searching will be used to ensure comprehensive article retrieval. The list of databases to be used is:

- PubMed
- CAB abstracts (including Organic Research Database)
- Embase
- ISI Web of Science
- Cochrane Library
- BIOSIS (Previews)
- SciSearch
- Pascal (French, English, Russian, German and other languages)
- Meta-register
- LILACS (Latin American and Caribbean Centre on Health Sciences Information)
- National Research Register
- Clinical Trials.gov
- USDA Organic Agriculture Information Access

7.2 Publication Selection

- Published peer-reviewed literature will be included in the review.
- Published peer-reviewed abstracts will be collated but not included in the review.
- Key authors will be contacted to identify relevant in-press articles.
- In-press articles will be included in the review as a separate category.
- Grey literature such as dissertations, conference proceedings, reports and other non peer-reviewed research will not be included.
- Review articles will be hand searched for relevant references.

7.3 Hand searching for cited references

Hand searching will be conducted to check completeness of initial electronic searches.

7.4 Data Range

Searching will be limited to the past 50 years i.e. 1st January 1958.

7.5 Language

All languages will be included in the searches. However, only publications with an English abstract will be considered.

7.6 Inclusion and Exclusion Criteria

On completion of the database searches, studies will be included or excluded from the review based on the following criteria:

Inclusion	Exclusion
All study types	Reviews
All full text articles with English abstract	Non-peer reviewed
All studies published between 1st January 1958 and 29th February 2008	

7.7 Definition of Farming or Production Practice

A clear, unambiguous definition of farming/production practice is essential for the conduct of research in this field. For the purpose of this review, organic production is defined by Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91. Other commonly cited national and international regulations on organic food production are included in Annex 3 for comparison. The definitions of organic and conventional foods (crops, livestock and processed foods) provided by authors in papers included in the review will be recorded, and mapped against the EC definition to show degree of concordance.

Farming and production practice will be searched for under the following search terms. This list will be expanded if additional terms are identified during the review process.

1. Organic
2. Food
3. Agriculture

4. Crop, Agricultural
5. Livestock
6. Conventional
7. Health food

7.8 Definition of *Nutrients and Other Substances*

The *nutrients and other substances* which will be searched for fall under the broad categories listed below [7]. Specific nutrients and substances will be further categorised according to the INFOODS [8] list of tags (a summary list of INFOODS tags is provided in Annex 4 the full list is available at: http://www.fao.org/infoods/tagnames_en.stm).

Carbohydrate
- Total carbohydrate
- Non-starch polysaccharides/dietary fibre
- Cereal fibre
- Vegetable fibre
- Fruit fibre
- Starch
- Resistant starch
- Sugars

Lipids
- Total fat
- Saturated fatty acids
- Monounsaturated fatty acids
- Polyunsaturated fatty acids
- n-3 fatty acids
- n-6 fatty acids
- Conjugated linoleic acid
- Industrially produced trans fatty acids
- Other dietary lipids, cholesterol, plant sterols and stanols.

Protein
- Total protein
- Plant protein
- Animal protein

Alcohol

Vitamins
- Vitamin A
- Retinol
- Provitamin A carotenoids
- Non-provitamin A carotenoids
- Riboflavin
- Thiamin (vitamin B1)
- Niacin
- Pyridoxine (vitamin B6)
- Cobalamin (vitamin B12)
- Vitamin C
- Vitamin D

- Vitamin E
- Vitamin K
- Other

Minerals
- Sodium
- Iron
- Calcium (and Vitamin D)
- Selenium
- Iodine
- Magnesium
- Potassium
- Zinc
- Copper
- Phosphorus
- Manganese
- Chromium
- Other

Phytochemicals
- Allium compounds
- Isothiocyanates
- Glucosinolates and indoles
- Polyphenols
- Saponins and coumarins
- Phytoestrogens e.g. genistein
- Caffeine
- Other

Other bioactive compounds
- Flavonoids and isoflavonoids
- Glycoalkaloids
- Cyanogens
- Oligosaccharides
- Anthocyanins

7.9 Retrieving papers

Papers identified as satisfying the inclusion criteria will be retrieved, either from the LSHTM library, directly from the journal website, or from the British Library. Other retrieval methods will be used as necessary.

7.10 Labelling of references

All references identified in the review will be entered into EndNote databases. A unique identifier will be assigned to each reference. The references (hard and electronic copies) will also be labelled with the reference number. At the end of the review process, all original sources of data (i.e. all references) will be sent to the FSA, together with the EndNote databases.

7.11 EndNote files

Three EndNote files will be sent to the FSA as follows:

1. A file containing the results of the initial search.
2. A file containing the papers excluded after reading full text.
3. A file containing the papers included after reading full text.

As an additional check of the search strategy, a list of included papers will be sent to the Expert Independent Review Panel who will be asked to check the list for completeness.

8. Study Selection Criteria

Based on the pre-defined inclusion and exclusion selection criteria, relevant papers will be selected from the database search for the review.

The initial database searches will identify a number of papers which will be collated into single EndNote files (EndNote file 1). The study selection criteria will be applied to the titles and abstracts generated from the literature search. Full papers of any study that cannot be excluded at this point will be obtained. Once these copies are obtained the inclusion/exclusion criteria will be applied and a decision made about each paper. The decision for inclusion of a paper will be performed in duplicate. Excluded papers (and the reason for exclusion) will be recorded in EndNote file 2. The full list of included papers will be recorded in EndNote file 3. Any disparity between the duplicate data entries will be resolved within the team.

9. Study Quality

Study quality will be categorised based on concordance with five fundamental factors presented in the conceptual framework (Annex 1). These factors have been defined *a priori* as essential to answer the research question (i.e. comparison of *nutrient and other substances* composition of organic and conventionally farmed and produced foods). Study quality will be grouped into two categories:

Satisfactory publications will contain all of the following:

- a clear definition of the organic production methods for the crop, livestock or foods analysed in the Introduction or Methods section of the paper;
- a statement of the cultivar of crop, or breed and species of livestock;

- a statement of which *nutrient(s) and other substance(s)* have been analysed;
- a clear description of the laboratory analytical methods used to test for the composition of named *nutrients and other substances*;
- a statement of the statistical methods used for data analyses.

Unsatisfactory publications will be those that do not specify all of the above.

10. Data Extraction

Access databases will be constructed for data extraction. These database will contain a set of fields for each study design, including characteristics of the study based on the conceptual outline and study results. Data extraction will be performed in duplicate for all included papers. The complete Access databases will be sent to the FSA when the data extraction processes are complete.

11. Potential sources of bias

Publication and citation bias

Publication bias is caused by the tendency of authors to write and submit, and peer reviewers and editors to accept and publish research, depending on the strength and direction of the results. If data availability permits, Funnel plots will be produced in order to assess the degree of publication bias [9].

Grey literature

The review will not include grey literature as it is difficult to draw a distinction between acceptable and unacceptable grey literature.

English-language bias

Negative studies are less likely to be published in English-language journals than positive studies and therefore may be published in foreign language journals. This problem should be minimised by including studies in other languages.

Multiple publication

Duplicate publication of studies, where the same data is presented in two different journals, or in the same journal at different times, could lead to over-sampling of data from the same research. This may arise with use of meta-analyses and other reviews. In such cases the individual papers will be used and not the meta-analyses or reviews.

Confounding

Confounding may explain an observed association (or lack of one) due to the occurrence together of the exposure being investigated, the outcome and a third factor that is associated with the exposure and independently affects the outcome. The conceptual framework (Annex 1) provides an outline on which to base exploration of possible confounding of studies.

Measurement errors

Measurement errors may be defined as the difference between the observed value and the corresponding true but unknown value. These errors may occur for example during the measurement of nutrient content of foodstuffs. Systematic errors in measurement may lead to bias and whether studies have identified and acted upon possible sources of measurement error will be documented.

12. Details of the data analysis

The overall aim of data synthesis is to collate and summarise the results of the studies included in the systematic literature review. Meta-analytic and narrative aspects of the data analysis complement each other: purely statistical analysis cannot capture and explore all the caveats and shortcomings of the research reviewed while a purely qualitative review will lack precision and may miss small associations of relevance to public health. If sufficient data are available, the results will be tabulated and plotted using Forest plots and summary statistics will be produced. If heterogeneity is detected then appropriate random effects models will be used.

13. Nutritional or Health Significance of Differences Found

If this review identifies any consistent differences in *nutrient or other substance* content between organic and conventionally produced foods, the potential nutritional or other health impacts of this difference will be assessed. This assessment will take into account: current population nutrient consumption levels, and macro- and micro-nutrient status (utilizing nationally representative data sources such as the National Diet and Nutrition Surveys), information on dietary requirements (utilizing national and international estimates of human macro- and micro-nutrient requirements), data on safety of high levels of nutrient intake (utilizing reports such as the FSA report on Safe Upper Levels), and subject specific public health knowledge of the importance of any differences for health

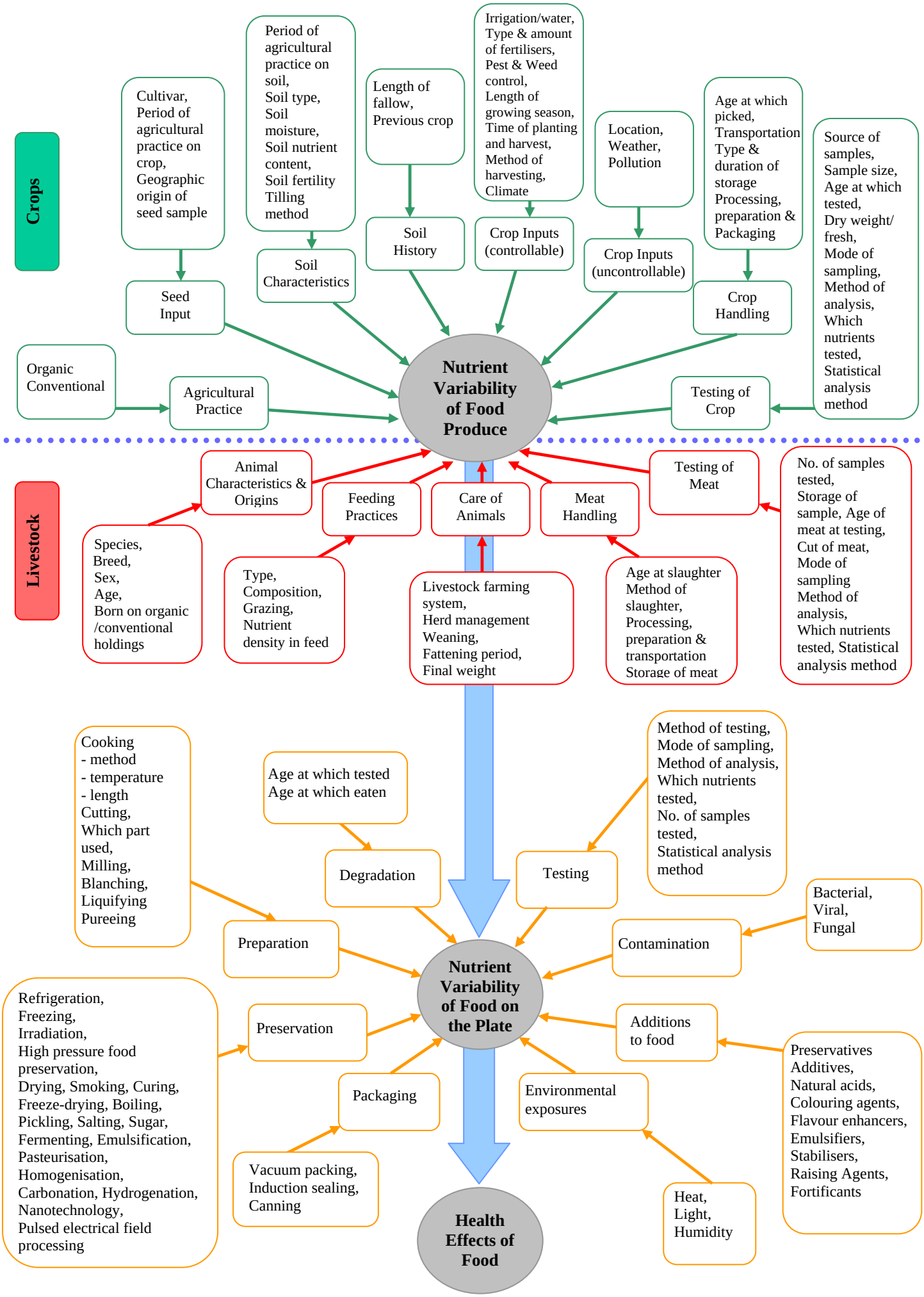
and disease states. Recommendations from expert bodies and published high quality systematic reviews will be used to guide this process.

14. References

1. Soil Association, *Organic Market Report 2007*. 2007, Soil Association.
2. Winter, C.K. and S.F. Davis, *Organic foods.* J Food Sci, 2006. **71**(9): p. R117-R124.
3. Worthington, V., *Nutritional quality of organic versus conventional fruits, vegetables, and grains.* J Altern Complement Med, 2001. **7**(2): p. 161-73.
4. Bourn, D. and J. Prescott, *A comparison of the nutritional value, sensory qualities, and food safety of organically and conventionally produced foods.* Crit Rev Food Sci Nutr, 2002. **42**(1): p. 1-34.
5. Woese, K., et al., *A comparison of organically and conventionally grown foods - results of a review of the relevant literature.* J Sci Food Agric, 1997. **74**: p. 281-93.
6. Williams, C.M., *Nutritional quality of organic food: shades of grey or shades of green?* Proc Nutr Soc, 2002. **61**(1): p. 19-24.
7. World Cancer Research Fund / American Institute for Cancer Research, *Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective*. 2007, Washington DC: AICR.
8. Klensin, I.C., Feskanich D., Lin, V., Truswell, A.S., Southgate, D.A.T., *Identification of food components for data interchange.* 1989, Tokyo: United Nations University. 106.
9. Sterne, J.A., M. Egger, and G. Davey Smith, *Investigating and dealing with publication and other biases.*, in *Systematic reviews in health care.*, M. Egger, G. Davey Smith, and D. Altman, Editors. 2001, BMJ books: London.

Annex 1

Conceptual Framework Outlining Factors Affecting Nutrient Variability


Crops
Cultivar, Period of agricultural practice on crop, Geographic origin of seed sample
Period of agricultural practice on soil, Soil type, Soil moisture, Soil nutrient content, Soil fertility Tilling method
Length of fallow, Previous crop
Irrigation/water, Type & amount of fertilisers, Pest & Weed control, Length of growing season, Time of planting and harvest, Method of harvesting, Climate
Location, Weather, Pollution
Age at which picked, Transportation Type & duration of storage Processing, preparation & Packaging
Source of samples, Sample size, Age at which tested, Dry weight/ fresh, Mode of sampling, Method of analysis, Which nutrients tested, Statistical analysis method
Seed Input
Soil Characteristics
Soil History
Crop Inputs (controllable)
Crop Inputs (uncontrollable)
Crop Handling
Organic Conventional
Agricultural Practice
Nutrient Variability of Food Produce
Testing of Crop
Livestock
Animal Characteristics & Origins
Feeding Practices
Care of Animals
Meat Handling
Testing of Meat
No. of samples tested, Storage of sample, Age of meat at testing, Cut of meat, Mode of sampling Method of analysis, Which nutrients tested, Statistical analysis method
Species, Breed, Sex, Age, Born on organic /conventional holdings
Type, Composition, Grazing, Nutrient density in feed
Livestock farming system, Herd management Weaning, Fattening period, Final weight
Age at slaughter Method of slaughter, Processing, preparation & transportation Storage of meat
Cooking - method - temperature - length Cutting, Which part used, Milling, Blanching, Liquifying Pureeing
Age at which tested Age at which eaten
Method of testing, Mode of sampling, Method of analysis, Which nutrients tested, No. of samples tested, Statistical analysis method
Degradation
Testing
Bacterial, Viral, Fungal
Preparation
Contamination
Nutrient Variability of Food on the Plate
Refrigeration, Freezing, Irradiation, High pressure food preservation, Drying, Smoking, Curing, Freeze-drying, Boiling, Pickling, Salting, Sugar, Fermenting, Emulsification, Pasteurisation, Homogenisation, Carbonation, Hydrogenation, Nanotechnology, Pulsed electrical field processing
Preservation
Additions to food
Preservatives Additives, Natural acids, Colouring agents, Flavour enhancers, Emulsifiers, Stabilisers, Raising Agents, Fortificants
Packaging
Environmental exposures
Vacuum packing, Induction sealing, Canning
Heat, Light, Humidity
Health Effects of Food

Annex 2
Search Terms

Terms for the search strategy for epidemiological literature as specified in the manual (WCRF, 2003):

#1 diet therapy[MeSH Terms] OR nutrition[MeSH Terms]

#2 diet[tiab] OR diets[tiab] OR dietetic[tiab] OR dietary[tiab] OR eating[tiab] OR intake[tiab] OR nutrient*[tiab] OR nutrition[tiab] OR vegetarian*[tiab] OR vegan*[tiab] OR "seventh day adventist"[tiab] OR macrobiotic[tiab] OR breastfeed*[tiab] OR breast feed*[tiab] OR breastfed[tiab] OR breast fed[tiab] OR breastmilk[tiab] OR breast milk[tiab]

#3 food and beverages[MeSH Terms]

#4 food*[tiab] OR cereal*[tiab] OR grain*[tiab] OR granary[tiab] OR wholegrain[tiab] OR wholewheat[tiab] OR roots[tiab] OR plantain*[tiab] OR tuber[tiab] OR tubers[tiab] OR vegetable*[tiab] OR fruit*[tiab] OR pulses[tiab] OR beans[tiab] OR lentils[tiab] OR chickpeas[tiab] OR legume*[tiab] OR soy[tiab] OR soya[tiab] OR nut[tiab] OR nuts[tiab] OR peanut*[tiab] OR groundnut*[tiab] OR seeds[tiab] OR meat[tiab] OR beef[tiab] OR pork[tiab] OR lamb[tiab] OR poultry[tiab] OR chicken[tiab] OR turkey[tiab] OR duck[tiab] OR fish[tiab] OR fat[tiab] OR fats[tiab] OR fatty[tiab] OR egg[tiab] OR eggs[tiab] OR bread[tiab] OR oils[tiab] OR shellfish[tiab] OR seafood[tiab] OR sugar[tiab] OR syrup[tiab] OR dairy[tiab] OR milk[tiab] OR herbs[tiab] OR spices[tiab] OR chilli[tiab] OR chillis[tiab] OR pepper*[tiab] OR condiments[tiab]

#5 fluid intake[tiab] OR water[tiab] OR drinks[tiab] OR drinking[tiab] OR tea[tiab] OR coffee[tiab] OR caffeine[tiab] OR juice[tiab] OR beer[tiab] OR spirits[tiab] OR liquor[tiab] OR wine[tiab] OR alcohol[tiab] OR alcoholic[tiab] OR beverage*[tiab] OR ethanol[tiab] OR yerba mate[tiab] OR ilex paraguariensis[tiab]

#6 fertilizers[MeSH Terms]

#7 fertiliser*[tiab] OR fertilizer*[tiab]

#8 food preservation[MeSH Terms]

#9 pickled[tiab] OR bottled[tiab] OR bottling[tiab] OR canned[tiab] OR canning[tiab] OR vacuum pack*[tiab] OR refrigerate*[tiab] OR refrigeration[tiab] OR cured[tiab] OR smoked[tiab] OR preserved[tiab] OR preservatives[tiab] OR nitrosamine[tiab] OR hydrogenation[tiab] OR fortified[tiab] OR additive*[tiab] OR colouring*[tiab] OR coloring*[tiab] OR flavouring*[tiab] OR flavoring*[tiab] OR nitrates[tiab] OR nitrites[tiab] OR solvent[tiab] OR solvents[tiab] OR ferment*[tiab] OR processed[tiab] OR antioxidant*[tiab] OR genetic modif*[tiab] OR genetically modif*[tiab] OR vinyl chloride[tiab] OR packaging[tiab] OR labelling[tiab] OR phthalates[tiab]

#10 cookery[MeSH Terms]

#11 cooking[tiab] OR cooked[tiab] OR grill[tiab] OR grilled[tiab] OR fried[tiab] OR fry[tiab] OR roast[tiab] OR bake[tiab] OR baked[tiab] OR stewing[tiab] OR stewed[tiab] OR casserol*[tiab] OR broil[tiab] OR broiled[tiab] OR boiled[tiab] OR microwave[tiab] OR microwaved[tiab] OR re-heating[tiab] OR reheating[tiab] OR heating[tiab] OR re-heated[tiab] OR heated[tiab] OR poach[tiab] OR poached[tiab] OR steamed[tiab] OR barbecue*[tiab] OR chargrill*[tiab] OR heterocyclic amines[tiab] OR polycyclic aromatic hydrocarbons[tiab]

#12 dietary carbohydrates[MeSH Terms] OR dietary proteins[MeSH Terms] OR sweetening agents[MeSH Terms]

#13 salt[tiab] OR salting[tiab] OR salted[tiab] OR fiber[tiab] OR fibre[tiab] OR polysaccharide*[tiab] OR starch[tiab] OR starchy[tiab] OR carbohydrate*[tiab] OR lipid*[tiab] OR linoleic acid*[tiab] OR sterols[tiab] OR stanols[tiab] OR sugar*[tiab] OR sweetener*[tiab] OR saccharin*[tiab] OR aspartame[tiab] OR acesulfame[tiab] OR cyclamates[tiab] OR maltose[tiab] OR mannitol[tiab] OR sorbitol[tiab] OR sucrose[tiab] OR xylitol[tiab] OR cholesterol[tiab] OR protein[tiab] OR proteins[tiab] OR hydrogenated dietary oils[tiab] OR hydrogenated lard[tiab] OR hydrogenated oils[tiab]

#14 vitamins[MeSH Terms]

#15 supplements[tiab] OR supplement[tiab] OR vitamin*[tiab] OR retinol[tiab] OR carotenoid*[tiab] OR tocopherol[tiab] OR folate*[tiab] OR folic acid[tiab] OR methionine[tiab] OR riboflavin[tiab] OR thiamine[tiab] OR niacin[tiab] OR pyridoxine[tiab] OR cobalamin[tiab] OR mineral*[tiab] OR sodium[tiab] OR iron[tiab] OR calcium[tiab] OR selenium[tiab] OR iodine[tiab] OR magnesium[tiab] OR potassium[tiab] OR zinc[tiab] OR copper[tiab] OR phosphorus[tiab] OR manganese[tiab] OR chromium[tiab] OR phytochemical[tiab] OR allium[tiab] OR isothiocyanate*[tiab] OR glucosinolate*[tiab] OR indoles[tiab] OR polyphenol*[tiab] OR phytoestrogen*[tiab] OR genistein[tiab] OR saponin*[tiab] OR coumarin*[tiab]

#16 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15

KEY:

[tiab]	searches the title and abstract fields only
[MeSH Terms]	searches the Medical Subject Headings field only N.B. – explosion of MeSH terms is automatic
*	truncation symbol – searches all words with this combination of letters at the beginning

Annex 3(a): Organic Regulations, General

	EC 834/2007	USDA/US NOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Scope of Regulation	Regulation 834/2007 applies to the following products: (a) live or unprocessed agricultural products;(b) processed agricultural products for use as food;(c) feed; (d) vegetative propagating material and seeds for cultivation. This Regulation shall also apply to yeasts used as food or feed. The products of hunting and fishing of wild animals are not considered as organic production.	US NOP regulates cultivated crop, wild crop, livestock, livestock feed and handling (preparation and processing) operations. For labelling purposes US only regulates the term 'organic', not derivatives or diminutives. US NOP exempts producers and handlers with less than $5000/year total organic sales from certification requirements, although they must comply with the regulation.	CODEX guidelines apply to: a) unprocessed plants and plant products, livestock and livestock products b) processed agricultural crop and livestock products intended for human consumption derived from above. These guidelines govern the production, preparation, marketing, labelling and inspection of these products.	Serve as guidelines for private and governmental agencies that set their own regional or other specialized standards for direct use in certification. They support the worldwide adoption of environmentally, socially, and economically sound systems based on the principles of organic agriculture. IFOAM provides a market guarantee of the integrity of organic claims. General Principle: Organic livestock husbandry is based on the harmonious relationship between land, plants and livestock, respect for the physiological and behavioural needs of livestock and the feeding of good-quality organically grown feedstuffs.	The Compendium applies to the following products, where such products bear, or are intended to bear, indications referring to the organic production method: (a) unprocessed agricultural crop products; also livestock and unprocessed livestock products; (b) processed agricultural crop and livestock products intended for human consumption prepared essentially from one or more ingredients of plant and/or animal origin; (c) feeding stuffs, compound feeding stuffs and feed materials not covered under (a).
Labelling Claims	Foods labelled as organic when at least 95 % by weight of its ingredients of agricultural origin are organic; Logo cannot be used on in-conversion products. The list of ingredients shall indicate which ingredients are organic.	The term, "organic," may only be used on labels and in labelling of raw or processed agricultural products, including ingredients, that have been produced. There are provisions for multi-ingredient products containing 100% (100% Organic), minimum 95% (Organic), minimum 70% (Made with Organic Ingredients) and products with less than 70% organic ingredients.	Organic products should be labelled in accordance with the Codex General Standard for the Labelling of Prepackaged Foods(1). Certain ingredients of agricultural origin not satisfying organic requirements may be used, within the limit of maximum level of 5% m/m of the total ingredients excluding salt and water in the final product. Added to this, the same ingredients shall not be derived from an organic and nonorganic origin. Member Countries can consider the following: the development of specific labelling provisions for products containing less than 95% ingredients of agricultural ingredients.	When the full standards requirements have been fulfilled, products should be labelled as “produce of organic agriculture” or a similar description. Product labels should identify all ingredients, processing methods, and all additives and processing aids. Where a minimum of 95% of the ingredients are of certified organic origin, products may be labelled “certified organic” or equivalent and should carry the certification mark of the certification body; where less than 95% but not less than 70% of the ingredients are of certified organic origin, products may not be called “organic”. The word “organic” may be used on the principal display in statements like “made with organic ingredients” provided there is a clear statement of the proportion of the organic ingredients. Where less than 70% of the ingredients are of certified organic origin, the indication that an ingredient is organic may appear in the ingredient list. Such product may not be called “organic.”	To be labelled 'organic', at least 95% of the ingredients of agricultural origin should be derived from products, or imported from third countries, under the rules laid down in the compendium. Processed products containing less than 70% organically-derived agricultural ingredients cannot be labelled as organic.

Annex 3(b): Organic Regulations, Crops

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Conversion Period	EC 834/2007 requires a 2 year conversion period for annuals and 3 years for perennials (with some exceptions). Retroactive approval of the conversion period may occur if sufficient proof is given that no banned substances have been used.	Any organic crops must have been managed in accordance with the USDA/USNOP requirements and have had no prohibited substances applied to them for at least 3 years prior to harvest of the crop.	Codex requires a conversion period of at least 2 year for annuals and 3 years for perennials (with the exception of grassland).	IFOAM standards require in general a period of at least 36 months for conversion. Depending on the previous land use, the conversion period can be reduced to 12 months. IFOAM states at least 12 months prior to the start of the production cycle and in the case of perennials (excluding pastures and meadows) a period of at least 18 months prior to harvest. The label for conversion products shall be clearly distinguishable from the label for organic products.	The principles set out in the UK Compendium must normally have been applied during a conversion period of at least 2 years before sowing, or, in the case of grassland, at least 2 years before its exploitation as feeding stuff from organic farming, or, in the case of perennial crops other than grassland, at least 3 years before the first harvest of products.
Origin of Seed	The mother plant in the case of seeds and the parent plant in the case of vegetative propagating material shall have been produced in accordance with the rules laid down in this Regulation for at least one generation, or, in the case of perennial crops, two growing seasons.	Organically grown seeds, annual seedlings, and planting stock must be used. There are exceptions where organic varieties are not commercially. Organically produced seed must be used for the production of edible sprouts.	Seeds and vegetative reproductive material should be from plants grown in accordance with the provisions of the principles of organic production for at least one generation or, in the case of perennial crops, two growing seasons.	Organic seed and plant material should be used. Where it is not available. non-organic seed is permitted. Seed and plant materials should be propagated under organic management for one generation in the case of annuals, and for perennials, 2 growing periods, or 12 months (which ever is longer), before being certified as organic seed and plant material.	The mother plant in the case of seeds, and the parent plant(s) in the case of vegetative propagating material must have been produced for at least one generation or, in the case of perennial crops, two growing seasons.
Fertilisation	The fertility and biological activity of the soil must be maintained or increased, in the first instance by: cultivation of legumes, green manures or deep-rooting plants in an appropriate multi-annual rotation programme. Fertilisers and soil conditioners may only be used if they have been authorised for use in organic production. Mineral nitrogen fertilisers are prohibited.	The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials. The producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances. The producer may not use any fertiliser or composted plant and animal material that contains a synthetic substance.	The fertility and biological activity of the soil should be maintained or increased, where appropriate, by: Cultivation of legumes, green manures or deep-rooting plants in an appropriate multi-annual rotation programme; incorporation in the soil of organic material, composted or not, from holdings producing in accordance with these guidelines. Synthetic nitrogen or non-protein nitrogen compounds shall not be used.	Material of microbial, plant or animal origin shall form the basis of the fertility program. Mineral fertilisers shall only be used in a program addressing long-term fertility needs together with other techniques such as organic matter additions, green manures, rotations and nitrogen fixation by plants. Mineral fertilisers shall be applied in the form in which they are naturally composed and extracted and shall not be rendered more soluble by chemical treatment. Chilean nitrate and all synthetic nitrogenous fertilisers, including urea, are prohibited.	The fertility and the biological activity of the soil must be maintained or increased, in the first instance, by cultivation of legumes, green manures or deep-rooting plants in an appropriate multi-annual rotation programme. Some fertilisers and soil conditioners may under certain circumstances, be used as a complement to organically derived green and animal manures in organic farming and are listed in the Compendium.

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Manure		Raw animal manure must either be composted, applied to land used for a crop not intended for human consumption, or incorporated into the soil at least 90 days before harvesting an edible product that does not come into contact with the soil or soil particles and at least 120 days before harvesting an edible product that does come into contact with the soil or soil particles.	By-products from livestock farming, such as farmyard manure, may be used if they come from livestock holdings producing in accordance with these guidelines. Manure application rates should be at levels that do not contribute to ground and/or surface water contamination. Member countries may establish maximum application rates for manure or stocking densities. The timing of application and application methods should not increase the potential for run-off into ponds, rivers and streams.	Manures containing human faeces and urine should not be used unless free of human pathogens. Manures containing human excrement (faeces and urine) are prohibited for use on crops for human consumption.	The total amount of manure, as defined in Directive 91/676/EEC, applied on the holding may not exceed 170 kg of Nitrogen per year/hectare of agricultural area used.
Plant Protection (Pest & Weed Control)	The prevention of damage caused by pests, diseases and weeds shall rely primarily on the protection by natural enemies, the choice of species and varieties, crop rotation, cultivation techniques and thermal processes; The EU Regulation only requires the choice of "appropriate" species and varieties to control diseases, pests and weed pressure.	Practices to prevent crop pests, weeds, and diseases including crop rotation, soil and crop nutrient management practices, sanitation measures and cultural practices should be controlled. A biological or botanical substance or a substance included on the national list of synthetic substances allowed for use in organic crop production may be applied to prevent, suppress, or control pests, weeds, or diseases.	Pests, diseases and weeds should be controlled by any one, or a combination, of the following measures: − choice of appropriate species and varieties; − appropriate rotation programs; − mechanical cultivation; − protection of natural enemies of pests through provision of favourable habitat, ecological buffer zones which maintain the original vegetation to house pest predators; − diversified ecosystems. These will vary between geographical locations. E.g. buffer zones to counteract erosion, agroforestry, rotating crops; − flame weeding; − natural enemies including release of predators and parasites; − biodynamic preparations from stone meal, farmyard manure or plants; − mulching and mowing; − grazing of animals; − mechanical controls such as traps, barriers, light and sound; − steam sterilization when proper rotation of soil renewal cannot take place	Pests, diseases and weeds should be managed by one, or a combination, of the following measures: a. choice of appropriate species and varieties; b. appropriate rotation programs; c. mechanical cultivation; d. protection of natural enemies of pests through provision of favourable habitat e. diversified ecosystems. E.g. buffer zones to counteract erosion, agro-forestry, rotating crops, intercropping, etc.; f. thermal weeding; g. seed bed preparation; h. natural enemies including release of predators and parasites; i. acceptable biodynamic preparations from stone meal, farmyard manure or plants; j. mulching and mowing, grazing of animals; k. controls such as traps, barriers, light and sound and physical methods as permitted, including the application of heat.	Pests, diseases and weeds shall be controlled by a combination of the following measures: - choice of appropriate species and varieties; - appropriate rotation programme; - mechanical cultivation procedures; - protection of natural enemies of pests through provisions favourable to them (e.g. hedges, nesting sites, release of predators); - flame weeding

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Buffer Zones	Operators should keep the land, animals, and products used for, or produced by, the organic units separate from those used for, or produced by, the non-organic units and keep adequate records to show the separation.	Any field or farm parcel must have distinct, defined boundaries and buffer zones such as runoff diversions to prevent the unintended application of a prohibited substance to the crop or contact with a prohibited substance applied to adjoining land that is not under organic management	Organic production should take place in a unit where the land parcels, production areas, farm buildings and storage facilities for crops and livestock are clearly separate from those of any other unit which is not certified organic.	The operator shall employ measures including barriers and buffer zones to avoid potential contamination and limit contaminants in organic products.	Production must take place in a unit of which the production premises, land parcels, pasturage, open-air exercise areas, open air runs, livestock buildings, and, where applicable, the premises for the storage of crops, crop products, livestock products, raw materials and inputs, are clearly separate from those of any other unit not producing in accordance with the rules laid down in the compendium.
Genetically Modified/Engineered Organisms (GMO/GEO)	GMOs not to be used as plant protection products, fertilisers, soil conditioners, seeds, vegetative propagating material.	No ruling against GMOs is included under USDA/USNOP legislation; crops that are certified organic may still contain GMOs.	All materials and/or the products produced from genetically engineered/modified organisms (GEO/GMO) are not compatible with the principles of organic production (growing, manufacturing, or processing) and therefore are not accepted.	Genetically Modified Organisms (GMOs) and their derivatives should be excluded from organic production processing and handling to the fullest extent possible.	GMOs are prohibited in foodstuffs, food ingredients (including additives and flavourings), processing aids (including extraction solvents), feeding stuffs, compound feeding stuffs, feed materials, feed additives, processing aids for feeding stuffs, certain products used in animal nutrition (under Directive 82/471/EEC) plant protection products, veterinary medicinal products, fertilisers, soil conditioners, seeds, vegetative reproductive material and livestock.
Ionising Radiation	The use of ionising radiation for the treatment of organic food or feed, or of raw materials used in organic food or feed is prohibited.	Ionising radiation is prohibited in the treatment and processing of foods.	Ionising radiation should not be used on organic products for the purpose of pest control, food preservation, elimination of pathogens or sanitation.	Ionising radiation is prohibited.	Organic products and their ingredients should not be subjected to treatments involving the use of ionising radiation.

Annex 3(c): Organic Regulations, Livestock

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Conversion Period	Conversion periods are specific to the animal species. For breeding purposes, non-organically raised animals may be brought onto a holding under specific conditions. Such animals and their products may be deemed organic after compliance with their specific conversion period. Animals and animal products in the conversion period may *not* be labelled as organic.	Livestock products that are to be labelled as organic must be from livestock under continuous organic management from the last third of gestation or hatching. Poultry must have been under continuous organic management beginning no later than the second day of life. Milk or milk products must be from animals that have been under continuous organic management beginning no later than 1 year prior to production. There are exceptions when an entire, distinct herd is converted to organic production. For the first 9 months of the year of conversion, the producer may provide the herd with a minimum of 80% feed that is either organic or produced from land included in the organic system plan and managed in compliance with organic crop requirements. During the final 3 months of the year of conversion, the producer must provide the herd feed in compliance with section. Livestock used as breeder stock may be brought from a non-organic operation.	Livestock may not be transferred between organic and non-organic units. Livestock products must come, from birth or hatching, from production units, or have been the offspring of parents raised under organic conditions. Competent authorities may reduce the conversion periods in certain cases a) pasture, open-air runs and exercise areas used by non-herbivore species; b) for bovine, equine, ovine and caprine coming from extensive husbandry during an implementation period established by the competent authority or dairy herds converted for the first time; c) if there is simultaneous conversion of livestock and land used only for feeding within the same unit, the conversion period for both livestock, pasture and/or land used for animal feed, may be reduced to two years only in the case where the existing livestock and their offspring are fed mainly with products from the unit.	When organic livestock is not available conventional animals may be brought in according to the following age limits: a. 2 day old chickens for meat production; b. 18 week old hens for egg production; c. 2 weeks for any other poultry; d. piglets up to 6 weeks and after weaning; e. dairy calves up to 4 weeks old that have received colostrum and are fed a diet consisting mainly of full milk. Breeding stock may be brought in from conventional farms to a yearly maximum of 10% of the adult animals of the same species on the farm. IFOAM requires a conversion period of at least 12 months prior to pastures, meadows and products harvested there from being considered organic. IFOAM requires 12 months of conversion for pastures.	To convert land for livestock, the whole area of the unit used for animal feed must comply with the rules on organic farming for plants. The conversion period may be reduced to 1 year for pasturages, open air runs and exercise areas used by non-herbivore species, where there is evidence that the areas concerned have not received any conventional materials. Livestock, other than poultry, intended for meat production must be raised from birth on a unit managed in accordance with these Standards. In addition, ewes, goats and sows whose progeny is intended for meat production must be managed in accordance with these standards after mating. Cattle whose progeny is intended for meat production must be managed in accordance with these standards for at least 12 weeks before calving. Otherwise, when a production unit is converted, livestock products may be sold as organic products, provided the livestock are reared according to the following rules: 6 months in the case of sheep for milk production; nine months in the case of cattle for milk production, except that the requirements of these Standards in respect of feed must be complied with for at least six months before the end of the conversion period; 10 weeks for poultry for meat production, brought in before they are three days old; six weeks in the case of poultry for egg production. If there is simultaneous conversion of the complete production unit, including livestock, pasturage and/or any land used for animal feed, the total combined conversion period for both livestock, pasturage and/or any land used for animal feed, shall be reduced to 24 months, subject to certain conditions.

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Origin of Livestock	Livestock must come from production units which comply with the rules on the various types of livestock production. Organic practices must be applied throughout their life. Males for breeding may be brought in from non organic-production stockfarms provided that the animals are subsequently reared and always fed in accordance with the rules laid down in this Regulation. Where livestock is obtained from units not complying with this Regulation, special attention must be paid to animal health measures; screening tests or quarantines may be used as necessary.	Livestock products that are to be labelled as organic must be from livestock under continuous organic management from the last third of gestation or hatching: Except that, (1) Poultry must have been under continuous organic management beginning no later than the second day of life; (2) Dairy animals. Milk or milk products must be from animals that have been under continuous organic management beginning no later than 1 year prior to the production. There are exceptions when an entire, distinct herd is converted to organic production. (3) Breeder stock. Livestock used as breeder stock may be brought from a non-organic operation.	Livestock used for organic products must come, from birth or hatching, from production units complying with these guidelines, or have been the offspring of parents raised under the conditions set down in these guidelines. They must be raised under this system throughout their life.	Animals shall be raised organically from birth. When organic livestock is not available conventional animals may be brought in according to the following age limits: a. 2 day old chickens for meat production; b. 18 week old hens for egg production; c. 2 weeks for any other poultry; d. piglets up to 6 weeks and after weaning; e. dairy calves up to 4 weeks old that have received colostrum and are fed a diet consisting mainly of full milk. Breeding stock may be brought in from conventional farms to a yearly maximum of 10% of the adult animals of the same species on the farm.	Livestock must come from production units which comply with the rules on the various types of livestock production laid down in these Standards. Throughout their life, this system of production must be applied. Livestock existing on the livestock production unit, not complying with these Standards can be converted. When a herd or flock is constituted for the first time and organically reared animals are not available in sufficient numbers, non-organically reared livestock may be brought into an organic livestock production unit, subject to a number of species-specific conditions, regarding age or size.
Breeding/Reproduction	The reproduction of organically reared livestock should be based on natural methods. Artificial insemination is allowed. Reproduction shall not be induced by treatment with hormones or similar substances, unless as a form of veterinary therapeutic treatment in case of an individual animal; other forms of artificial reproduction, such as cloning and embryo transfer, shall not be used.	Traditional breeding, hybridisation, in vitro fertilisation, and tissue culture are accepted.	Breeding methods should be in compliance with the principles of organic farming taking into account: a) the breeds and strains suitable for raising under local conditions and under an organic system; b) the preference for reproduction through natural methods, although artificial insemination may be used; c) that embryo transfer techniques and the use of hormonal reproductive treatment shall not be used; d) that breeding techniques employing genetic engineering must not be used.	Breeding systems shall be based on breeds that can reproduce successfully under natural conditions without human involvement. Artificial insemination is permitted. Embryo transfer techniques and cloning are prohibited. Hormones are prohibited to induce ovulation and birth unless applied to individual animals for medical reasons and under veterinary supervision.	The reproduction of organically reared livestock should be based on natural methods. Nevertheless, artificial insemination is permitted. Other forms of artificial or assisted reproduction (for example embryo transfers) are prohibited. The use of hormones or similar substances to control reproduction (e.g. induction or synchronisation of oestrus), is prohibited.

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Livestock Housing & Stocking Densities	Permanent access to open air areas, preferably pasture, whenever weather conditions & state of the ground allow, unless restrictions and obligations related to the protection of human and animal health are imposed. Appropriate stocking densities, and housing conditions shall ensure that the developmental, physiological and ethological needs of animals are met.	Producers must provide access to the outdoors, shade, shelter, exercise areas, fresh air, and direct sunlight suitable to the species, its stage of production, the climate, and the environment, including access to pasture for ruminant animals. Producers must also provide appropriate clean, dry bedding, and, if the bedding is typically consumed by the species, it must comply with applicable organic feed requirements. Producers must provide shelter designed to allow for the natural maintenance, comfort level, and opportunity to exercise appropriate to the species. The shelter must also provide the temperature level, ventilation, and air circulation suitable to the species and reduce the potential for livestock injury. Producers may provide temporary confinement of an animal because of inclement weather; the animal's stage of production; conditions under which the health, safety, or well-being of the animal could be jeopardized; or risk to soil or water quality.	Free range conditions for all animals are required, but Codex accepts that animals are confined for temporarily restricted times and certain reasons. Housing for livestock will not be mandatory in areas with appropriate climatic conditions to enable animals to live outdoors. Housing conditions should meet the biological and behavioural needs of the livestock by providing: − easy access to feeding and watering; − insulation, heating, cooling and ventilation of the building to ensure that air circulation, dust level, temperature, relative air humidity and gas concentration are kept within limits which are not harmful to the livestock; − plentiful natural ventilation and light to enter. The stocking density should: provide for the comfort and well being of the livestock, take into account the behavioural needs of the livestock, provide them with sufficient space to assume all natural postures and movements. Free-range, open-air exercise areas, or open-air runs should, if necessary, provide sufficient protection against rain, wind, sun and extreme temperatures, depending on the local weather conditions and the breed concerned. The outdoor stocking density of livestock kept on pasture, grassland, or other natural or semi-natural habitats, must be low enough to prevent degradation of the soil and over-grazing of vegetation.	Housing conditions shall ensure: a. ample access to fresh water and feed according to the needs of the animals; b. animals have sufficient space to stand naturally, lie down easily, turn around, groom themselves and assume all natural postures and movements; c. where animals require bedding, adequate natural materials are provided; d. that construction provides for insulation, heating, cooling and ventilation of the building, that permits air circulation, dust levels, temperature, relative air humidity, and gas concentrations to within levels that are not harmful to the livestock; e. that poultry, rabbits and pigs shall not be kept in cages; f. that animals are protected from predation by wild and feral animals. Landless animal husbandry systems are prohibited. All animals shall have access to pasture or an open-air exercise area or run, whenever the physiological condition of the animal, the weather and the state of the ground permit. Such areas may be partially covered. Additionally, the operator shall ensure that the environment, the facilities, stocking density and flock/herd size provides for the behavioural needs of the animals.	The livestock must have easy access to feeding and watering. Insulation, heating and ventilation of the building must ensure that air circulation, dust level, temperature, relative air humidity and gas concentration, are kept within limits which are not harmful to the animals. The building must permit plentiful natural ventilation and light to enter. Free-range, open-air exercise areas, or open-air runs must, if necessary, provide sufficient protection against rain, wind, sun and extreme temperatures, depending on the local weather conditions and the breed concerned. Minimum surface areas for indoor housing and outdoor exercise areas exist, stated as minimum animals/m2 density.

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Animal Fodder	Livestock should be fed with organic feed composed of agricultural ingredients from organic farming and natural non-agricultural substances. A part of the ration may contain feed from holdings which are in conversion to organic farming. Growth promoters and synthetic amino-acids are prohibited and suckling mammals shall be fed with natural, preferably maternal, milk.	The total feed ration for livestock managed in an organic operation must be composed of agricultural products, including pasture and forage, that are organically produced, except for non-synthetic substances and synthetic substances included on the National List. The producer must not feed animals under organic management plastic pellets for roughage or formulas containing urea or manure. The feeding of mammalian and poultry slaughter by-products to mammals or poultry is prohibited. The producer must not supply animal feed, feed additives, or feed supplements in violation of the Federal Food, Drug, and Cosmetic Act.	All livestock systems should provide the optimum level of 100% of the diet from organic feedstuffs (including 'in conversion' feedstuffs). Feedstuffs of mineral origin, trace elements, vitamins, or provitamins can only be used if they are of natural origin. In case of shortage of these substances, or in exceptional circumstances, chemically well-defined analogic substances may be used; Feedstuffs of animal origin, with the exception of milk and milk products, fish, other marine animals and their products should generally not be used or, as provided by national legislation. In any case, the feeding of mammalian material to ruminants is not permitted with the exception of milk and milk products; Synthetic nitrogen or non-protein nitrogen compounds shall not be used.	Animals shall be fed organic feed. The prevailing part (at least more than 50%) of the feed should come from the farm unit itself or be produced in co-operation with other organic farms in the region. The following substances are prohibited in the diet: a. farm animal by-products (e.g. abattoir waste) to ruminants; b. slaughter products of the same species; c. all types of excrements including droppings, dung or other manure; d. feed subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents; e. amino-acid isolates; f. urea and other synthetic nitrogen compounds; g. synthetic growth promoters or stimulants; h. synthetic appetizers; i. preservatives, except when used as a processing aid; j. artificial colouring agents. Animals may be fed vitamins, trace elements and supplements from natural sources. All ruminants shall have daily access to roughage. Young stock from mammals shall be provided maternal milk or organic milk from their own species and shall be weaned only after a minimum time that takes into account the natural behaviour of the relevant animal species.	Livestock must be fed on organically produced feeding stuffs. For herbivores, except during the period each year when the animals are under transhumance, at least 50% of the feed shall come from the farm unit itself or in case this is not feasible, be produced in co-operation with other organic farms. Up to 30% of the feed formula of rations on average may comprise in-conversion feeding stuffs. When the in-conversion feeding stuffs come from a unit of the own holding, this percentage can be increased to 60%. The feeding of young mammals must be based on natural milk, preferably maternal milk. Antibiotics, coccidiostats, medicinal substances, growth promoters or any other substance intended to stimulate growth or production shall not be used in animal feeding. Feedstuffs must not contain GMOs

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Veterinary Treatments & Medical Supplies	Disease prevention shall be based on breed and strain selection, husbandry management practices, high quality feed and exercise, appropriate stocking density and adequate and appropriate housing maintained in hygienic conditions; chemically synthesised allopathic veterinary medicinal products including antibiotics may be used where necessary and under strict conditions, when the use of phytotherapeutic, homeopathic and other products is inappropriate. The use of immunological veterinary medicines is allowed.	No antibiotics or hormones allowed. When preventive practices and veterinary biologics are inadequate to prevent sickness, a producer may administer synthetic medications. The producer of an organic livestock operation must not: administer any animal drug other than vaccinations, in the absence of illness, however the producer of an organic livestock operation must administer vaccines and other veterinary biologics as needed to protect the well-being of animals. The producer may not administer synthetic parasiticides to breeder stock during the last third of gestation or during lactation if the progeny is to be sold, labelled, or represented as organically produced. After administering synthetic parasiticides to dairy stock, the producer must observe a 90-day withdrawal period before selling the milk or milk products produced from the treated animal as organically produced.	Where specific disease or health problems occur and no alternative permitted treatment or management practice exists, vaccination of livestock, the use of parasiticides, or therapeutic use of veterinary drugs are permitted; phytotherapeutic (excluding antibiotics), homeopathic or ayurvedic products and trace elements shall be used in preference to chemical allopathic veterinary drugs or antibiotics. If the use of the above products is unlikely to be effective in combating illness or injury, chemical allopathic veterinary drugs or antibiotics may be used under the responsibility of a veterinarian; withholding periods should be the double of that required by legislation with, in any case, a minimum of 48 hours. The use of chemical allopathic veterinary drugs or antibiotics for preventative treatments is prohibited.	An operator may use chemical allopathic veterinary drugs or antibiotics only if: a. preventive and alternative practices are unlikely to be effective to cure sickness or injury; b. they are used under the supervision of a veterinarian, and c. withholding periods shall be not less than double of that required by legislation, or a minimum of 48 hours, whichever is longer. Substances of synthetic origin used to stimulate production or suppress of natural growth are prohibited. Vaccinations are allowed with the following limitations: a. when an endemic disease is known or expected to be a problem in the region of the farm and where this disease cannot be controlled by other management techniques, or b. when a vaccination is legally required, and c. the vaccine is not genetically engineered.	Phytotherapeutic, homoeopathic products, and trace elements and products shall be used in preference to chemically-synthesised allopathic veterinary medicinal products or antibiotics. Disease prevention is based on: the selection of appropriate breeds or strains of animals, the application of animal husbandry practices appropriate to the requirements of each species, encouraging strong resistance to disease and the prevention of infections, the use of high quality feed, together with regular exercise and access to pasturage. The use of chemically synthesised allopathic veterinary medicinal products or antibiotics for preventive treatments is prohibited. The use of substances to promote growth or production, (including antibiotics, coccidiostats and other artificial aids for growth promotion purposes) and the use of hormones or similar substances to control reproduction (e.g. induction or synchronisation of oestrus), or for other purposes, is prohibited. Organophosphates are permitted when a suitable alternative is not available.
Transport of Livestock	Transport shall ensure that the welfare of animals is maintained and the duration shall be minimised.	No specific provisions for transport of organic animals	The transport of living stock should be managed in a calm and gentle way and in a manner which avoids stress, injury and suffering: the competent authority should establish specific conditions in order to meet these objectives and may establish maximum transport periods. In transporting livestock, the use of electric stimulation or allopathic tranquilisers is not permitted.	Animals be handled calmly and gently during transport and slaughter. The use of electric prods and other such instruments is prohibited. Animals shall not be treated with synthetic tranquilisers or stimulants prior to or during transport. Slaughterhouse journey times shall not exceed eight hours.	Must be carried out to minimise stress suffered by animals. No electrical stimulation may be used to coerce animals. Allopathic tranquilisers are prohibited.

	EC 834/2007	USDA/USNOP 2002	CODEX 1999 (Revised 2007)	IFOAM 2005	DEFRA UK Compendium 2006
Slaughter	Any suffering, including mutilation, shall be kept to a minimum during the entire life of the animal, including at the time of slaughter.	No specific provisions for slaughter of organic animals	The slaughter of livestock should be undertaken in a manner which minimizes stress and suffering, and in accordance with national rules.	Animals be handled calmly and gently during transport and slaughter. The use of electric prods and other such instruments is prohibited. Each animal should be stunned before being bled to death. The equipment used for stunning should be in good working order. Exceptions can be made according to cultural practice.	Minimum age requirements for slaughter laid down for poultry.
Contaminant Buffer Zones	Operators should keep the land, animals, and products used for, or produced by, the organic units separate from those used for, or produced by, the non-organic units and keep adequate records to show the separation.	None stated	Organic production should take place in a unit where the land parcels, production areas, farm buildings and storage facilities for crops and livestock are clearly separate from those of any other unit which is not certified organic.	The operator shall employ measures including barriers and buffer zones to avoid potential contamination and limit contaminants in organic products.	Production must take place in a unit of which the production premises, land parcels, pasturage, open-air exercise areas, open air runs, livestock buildings, and, where applicable, livestock products, raw materials and inputs, are clearly separate from those of any other unit not produced in accordance with organic regulations.
Genetically Modified/Engineered Organisms (GMO/GEO)	GMOs should not be used in organic farming or in the processing of organic products.	No ruling against GMOs is included under USDA/USNOP legislation.	All materials and/or the products produced from genetically engineered/modified organisms (GEO/GMO) are not compatible with the principles of organic production (growing, manufacturing, or processing) and therefore are not accepted	The use of genetically engineered organisms or their derivatives is prohibited. This shall include animals and farm inputs such as vaccines. Organic processed products shall not use ingredients, additives or processing aids derived from GMOs.	GMOs are prohibited in foodstuffs, food ingredients (including additives and flavourings), processing aids (including extraction solvents), feeding stuffs, compound feeding stuffs, feed materials, feed additives, processing aids for feeding stuffs, certain products used in animal nutrition (under Directive 82/471/EEC) plant protection products, veterinary medicinal products, fertilisers, soil conditioners, seeds, vegetative reproductive material and livestock.
Ionising Radiation	The use of ionising radiation for the treatment of organic food or feed, or of raw materials used in organic food or feed is prohibited.	Ionising radiation is prohibited in the treatment and processing of foods.	Ionising radiation should not be used on organic products for the purpose of pest control, food preservation, elimination of pathogens or sanitation.	Ionising radiation is prohibited.	Organic products and their ingredients should not be subjected to treatments involving the use of ionising radiation.

Annex 4
Abbreviated INFOODS Tag Names
Full INFOODS Tag list available at:
http://www.fao.org/infoods/tagnames_en.stm

Energy <ENERC>
Moisture <WATER>
Nitrogen <NT>
Protein <PROCNT>
Fat <FAT>
Ash <ASH>
Fructose <FRUS>
Glucose <GLUS>
Sucrose <SUCS>
Maltose <MALS>
Lactose <LACS>
Galactose <GALS>
Maltotriose <MALTRS>
Sugars, total <SUGAR>
Starch <STARCH>
Glycogen <GLYC>
Dextrins <DEXTN>
Maltodextrin
Raffinose <RAFS>
Stachyose <STAS>
Oligosaccharides, total <OLSAC>
Inulin <INULN>
Available Carbohydrate <CHOAVL>
Carbohydrate by difference <CHOCDF>
Glycerol <GLYRL>
Mannitol <MANTL>
Sorbitol <SORTL>
Total Dietary Fibre <FIBTG>
Alcohol (mass basis) <ALC>
Alcohol by Volume
Aluminium <AL>
Antimony <SB>
Arsenic <AS>
Cadmium <CD>
Calcium <CA>
Chromium <CR>
Cobalt <CO>
Copper <CU>
Fluoride <FD>
Iodine <ID>
Iron <FE>
Lead <PB>
Magnesium <MG>
Manganese <MN>
Mercury <HG>

Molybdenum <MO>
Nickel <NI>
Phosphorus <P>
Potassium <K>
Selenium <SE>
Sodium <NA>
Sulphur <S>
Tin <SN>
Zinc <ZN>
Thiamin <THIA>
Riboflavin <RIBF>
Niacin <NIA>
Niacin derived from Tryptophan or Protein <NIATRP>
Niacin Equivalents <NIAEQ>
Vitamin B6 <VITB6A>
Vitamin B12 <VITB12>
Biotin
Folate <FOLFD>
Folic Acid <FOLAC>
Dietary Folate Equivalents <FOLDFE>
Pantothenic Acid <PANTAC>
Vitamin C <VITC>
Alpha Carotene <CARTA>
Beta Carotene <CARTB>
Cryptoxanthin <CRYPX>
Beta Carotene equivalents <CARTBEQ>
Retinol <RETOL>
Retinol Equivalents <VITA>
Cholecalciferol <CHOCAL>
25-hydroxy vitamin D
Vitamin D3 Equivalents
Alpha Tocopherol <TOCPHA>
Alpha Tocotrienol <TOCTRA>
Beta Tocopherol <TOCPHB>
Beta Tocotrienol <TOCTRB>
Delta Tocopherol <TOCPHD>
Delta Tocotrienol <TOCTRD>
Gamma Tocopherol <TOCPHG>
Gamma Tocotrienol <TOCTRG>
Vitamin E <VITE>
C4:0 <F4D0>
C6:0 <F6D0>
C8:0 <F8D0>
C10:0 <F10D0>
C11:0
C12:0 <F12D0>
C13:0 <F13D0>
C14:0 <F14D0>
C15:0 <F15D0>
C16:0 <F16D0>
C17:0 <F17D0>
C18:0 <F18D0>

C19:0 <F19D0>
C20:0 <F20D0>
C21:0 <F21D0>
C22:0 <F22D0>
C24:0 <F24D0>
Total Saturated Fatty Acids <FASAT>
C10:1 <F10D1>
C14:1 <F14D1>
C15:1 <F15D1>
C16:1 <F16D1>
C17:1 <F17D1>
C18:1 <F18D1>
C20:1 <F20D1>
C22:1 <F22D1>
C24:1 <F24D1>
Total Monounsaturated Fatty Acids <FAMS>
C18:2 (undifferentiated) <F18D2>
C18:2w6 <F18D2CN6>
C18:3 (undifferentiated) <F18D3>
C18:3w3 <F18D3N3>
C18:3w6 <F18D3N6>
C18:4 (undifferentiated) <F18D4>
C18:4w3 <F18D4N3>
C20:2 (undifferentiated) <F20D2>
C20:2w6 <F20D2N6>
C20:3 (undifferentiated) <F20D3>
C20:3w3 <F20D3N3>
C20:3w6 <F20D3N6>
C20:4 (undifferentiated) <F20D4>
C20:4w6 <F20D4N6>
C20:5 (undifferentiated) <F20D5>
C20:5w3 <F20D5N3>
C22:2w6
C22:4 (undifferentiated) <F22D4>
C22:4w6
C22:5 (undifferentiated) <F22D5>
C22:5w3 <F22D5N3>
C22:6 (undifferentiated) <F22D6>
C22:6w3 <F22D6N3>
Total Polyunsaturated Fatty Acids <FAPU>
Total Long Chain Omega 3 Polyunsaturates
Cholesterol <CHOLE>
Alanine <ALA>
Arginine <ARG>
Aspartic Acid <ASP>
Cystine + Cysteine <CYS>
Glutamic Acid <GLU>
Glycine <GLY>
Histidine <HIS>
Isoleucine <ILE>
Leucine <LEU>
Lysine <LYS>

Methionine <MET>
Phenylalanine <PHE>
Proline <PRO>
Serine <SER>
Threonine <THR>
Tryptophan <TRP>
Tyrosine <TYR>
Valine <VAL>
Acetic Acid <ACEAC>
Butyric Acid <F4D0>
Citric Acid <CITAC>
Fumaric Acid <FUMAC>
Lactic Acid <LACAC>
Malic Acid <MALAC>
Oxalic Acid <OXALAC>
Propionic Acid <PROPAC>
Quinic Acid <QUINAC>
Shikimic Acid <SHIKAC>
Succinic Acid <SUCAC>
Tartaric Acid <TARAC>
Caffeine <CAFFN>