

Q&As

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The meaning of plant-based eating

There is no agreed definition of a plant-based diet. According to the literature investigating the health effects of plant-based eating, dietary patterns may differ in the amounts of animal origin foods they contain. Some include small amounts of meat or fish (such as flexitarianism / pescatarianism) whereas others exclude these but include dairy and/or eggs (lacto-ovo- or ovo-vegetarian). In the strictest sense, some plant-based patterns involve the complete avoidance of animal origin foods i.e. veganism.

Q: How many days a week do you think people should reduce meat consumption to, to see a change in health?

A: It is difficult to put a specific number against this. From the research presented in the [webinar](#), we know that there are incremental gains to be had, suggesting that any level of shift towards including more plants and a reduction in animal origin foods, will be beneficial. The further along the continuum you move, the greater the potential health and environmental benefits.

Q: Are we trying to get to a complete plant-based diet population or reduce dependency on animal diet?

A: From a practical point of view and based on the evidence, any level of increase in plant foods combined with a decrease in animal foods should deliver health benefits. Certainly, there would be huge environmental gains to be had if everyone converted to a vegan diet (and obviously gains on the animal welfare perspective) but meeting nutritional requirements on a vegan diet is not so straightforward. Therefore, we should be encouraging people to base as much of their diets on good quality, whole plant foods as is practicable to them.

Q: Is there an official definition for 'flexitarian'?

A: Not as such, but according to the Oxford English Dictionary, flexitarian is a combination of “flexible” and “vegetarian”, referring to an individual who follows a primarily but not strictly vegetarian diet, occasionally eating meat or fish. Therefore, a flexitarian diet is a plant-based diet.

Vegan diets

Q: What about B12 when following a vegan diet – is a supplement recommended for everyone? What about Vitamin B12? Is it more likely to be deficient in a plant-based diet? Do all people following a plant-based diet need to take B12 supplement?

A: Plant-based dietary patterns encompass a wide range of dietary regimens that are predominantly based on plant foods. A plant-based dietary pattern can therefore include small quantities of meat and other animal origin foods, vegetarianism or veganism. The extent to which animal origin foods are included within the diet impacts upon whether a vitamin B12 supplement would be needed.

Vitamin B12 (cobalamin) is only synthesized by micro-organisms and is therefore only found in foods of animal origin. As such, individuals choosing to follow a plant-based dietary pattern which excludes meat or all animal products (vegans and vegetarians*) will need alternative sources. While it is theoretically possible to meet requirements using fortified foods and drinks, it is preferable to recommend a supplement to ensure sufficient B12 is consumed. Ideally supplements should be chewable or sublingual (dissolve under the tongue) as some people don't absorb B12 well from tablets swallowed whole.¹ The adult requirement for B12 is 1.5µg per day in the UK.² The Irish RDA is

3.0µg per day (based on more recent data and similar to US recommendations).³ The Vegan Society recommends 10µg per day or at least 2000µg weekly.⁴

A recent review has shown that vegetarians develop B12 deficiency regardless of demographic characteristics, place of residency, age or the type of vegetarian diet consumed.⁵ This suggests that those excluding meat or consuming low amounts should take a B12 supplement.

Q: Would you say that someone who is at risk of osteoporosis would be better off not having a vegan diet, given higher recommended calcium intakes?

A: No. Remembering that for most of human history, people have acquired their calcium from plants, and more importantly, a good lifestyle for optimal bone health involves more than just calcium and optimum nutrition. All nutrients essential for bone health (including calcium, magnesium, vitamin D, selenium, protein) are readily available from plant foods – naturally present or through fortification in the case of vitamin D. A systematic review and meta-analysis looking at the impact of vegetarianism on bone mineral density concluded that *“there is a modest effect of vegetarian diets, particularly a vegan diet on BMD, but the effect size is unlikely to result in a clinically important increase in fracture risk”*.⁶

The UK Reference Nutrient Intake for adults is 700mg per day and the Irish Recommended Daily Allowance is 800mg per day and those with or at risk of osteoporosis may be advised to consume higher amounts around 1,000mg per day. It is possible to achieve adequate calcium intakes on a plant-only diet. There is a helpful article from the Osteoporosis Society which includes information on good plant-based sources of calcium, available here: <https://npw.org.uk/media/98504/vegan-diets-and-bone-health-article.pdf>. Vegans are generally advised to have 6 to 8 servings of calcium-rich foods a day, with a serving about half of cup of fortified plant-based drinks, half a cup of cooked, calcium-rich vegetables such as kale, collard greens, broccoli or sweet potato, half a cup of tofu or tempeh, 2 tablespoons of almond butter or tahini, half a cup of dried figs.⁷

Soya, isoflavones and safety

Q: Some people are avoiding soya due to some conflicting guidelines. What is a safe intake? Are there any negative effects when consuming soya weekly?

A: Soya has been a staple food in Asia for a very long time; with traditional soya foods including both fermented and unfermented versions such as miso, natto and tempeh (fermented) and edamame, tofu and soya drinks. In the most recent dietary guidelines from the UK, Europe and US, fortified soya drinks are included within the dairy section and tofu and other soya products within the protein section.^{8,9,10} This reflects the overwhelming evidence that consumption of soya foods as part of a balanced diet is not only healthful but does not result in any negative health outcomes for men or women.

Much of the confusion around isoflavones can be attributed to statements based on theoretical potential and findings from rodent studies fed isoflavones at very high doses as well as a handful of case studies where individuals followed an exceptionally unbalanced diet. Rodent studies are of questionable utility for providing insight into human nutrition due to the significant physiological differences between the two species.¹¹ This is especially true in the case of isoflavones because of the differences in metabolism of these soya bean constituents between rodents and humans.¹¹

With regards to soya food consumption and breast cancer, the American Institute for Cancer Research concludes *“overall, human studies show soy foods do not increase risk and in some cases, research suggests they may lower it”*.¹² In 2014, the World Cancer Research Fund (WCRF) concluded

that soya may improve the survival of breast cancer patients.¹³ Additionally, after an extensive review of the scientific literature, the European Food Safety Authority (EFSA) concluded that isoflavones do not adversely affect breast tissue in postmenopausal women.¹⁴

With regard to men's health: Comprehensive reviews of clinical studies have conclusively demonstrated that soya foods do not adversely affect oestrogen or testosterone levels in men, nor do they affect sperm quality or count.^{15,16,17,18}

What are isoflavones?

Isoflavones are naturally occurring phytochemicals which are similar in chemical structure to human oestrogen, however, the way they behave in the body is different. This is not surprising as small differences in chemical structure can lead to very different physiological effects. For example, cholesterol and sterols have almost identical chemical structures, but the former modestly raises blood cholesterol whereas the latter markedly lowers it.^{19,20}

Isoflavones have been classified as natural selective oestrogen receptor modulators (SERMs) due to their varied actions in the human body.¹¹ Other SERMs include the anti-breast cancer pharmaceuticals tamoxifen and raloxifene. They have been classified as SERMs due their ability to exert an oestrogenic effect in some tissues, anti-estrogenic effects in others, while they may have no effect at all in tissues affected by oestrogen.^{11,21,22,23}

Additionally, isoflavones and oestrogen differ in how they interact with oestrogen receptors alpha (ER- α) and beta (ER- β) found in many tissues including breast, bone and prostate. Isoflavones preferentially bind to and activate ER β whilst the hormone oestrogen has equal affinity and activation for both receptors. This is important because in general, activation of ER α has a proliferative effect in tissues whereas activation of ER β is anti-proliferative.

How much soya foods should be consumed?

Soya foods should be consumed as part of a healthy balanced diet. This can translate to a couple of servings of soya foods a day. The AICR recommends 1 to 2 standard servings daily of whole soya foods, such as tofu, soya drinks, edamame and soya nuts.¹² Studies have also demonstrated no negative health associations in Asian populations consuming up to 3 servings/day (equivalent to 100 mg isoflavones /day).

One serving averages about 7 grams of soya protein and 25 mg isoflavones.¹² Therefore, one serving of UK available soya foods would equate to:

- 200ml-250ml soya alternative to milk
- 150-200g soya alternative to yogurt
- 50g soya mince (reconstituted)
- 50g hard silken tofu
- 80g fresh or frozen edamame beans
- 15g soya nuts / roasted edamame beans

Recommended further reading:

- Messina, M et al. Health impact of childhood and adolescent soy consumption. *Nutrition Reviews*. 2017;75(7), pp.500-15.
- Messina, M. Soy and health update: evidence of the clinical and epidemiologic literature. *Nutrients*. 2016;8(12), pp.E574.

Nutrient quality & bioavailability

Q: So, with regards to amino acids - are we now dispelling the incomplete amino acids being in plant foods? And the concept of ensuring complete proteins through combinations i.e. beans and rice. Are we now more promoting a variety of plant-based foods consumed over a whole day and that is how we can easily achieve full amino acid profiles? I wasn't aware that all plant-based proteins provide a full AA profile. Why is this such a common misconception?

A: The roots of this concept - needing to combine proteins from plants at meals to ensure a higher quality – stems from a book in the 1970s called *Diet for a Small Planet* - and so as an idea it has been around for a long time and is entrenched in nutrition dogma. I think one thing that has continued to perpetuate this notion is language use, because 'incomplete' suggests missing one or more essential amino acids, which simply isn't the case. The second thing is that nutrition science is very fond of comparing one food to another like it were a competition of sorts. However, we don't rely on single foods for all our nutrition and so relative measures can give a much skewed perspective of what the total diet looks like.

Q: Is phosphate in soya alternatives to milk equivalent to cow's milk? Soya is lower in phosphate than cow's milk?

A: Questions regarding phosphate are relevant for a discussion on protein sources because phosphate in the diet is generally found in protein-containing foods. While animal foods are rich in readily absorbable phosphate, plant foods such as fruits and vegetables are relatively low. Whole grains, nuts and legumes including soya are higher in phosphate (although generally lower than animal origin foods) and it is less bioavailable as most it is tied up in poorly absorbed phytates.²⁴ For example, the phosphate content of legumes varies from 300 to 590 mg/100g and in cereal grains from 120 to 360 mg/100g.²⁵

With regards to soya specifically, phosphate is naturally present in soya beans (250mg / 100g cooked weight) and therefore soya drinks do contain it, however, at much lower levels than the soya beans and dairy. The amount of phosphate will vary from product to product and manufacturers should be able to provide information on levels in their own range. Products fortified with tri-calcium phosphate rather than calcium carbonate will contain higher amounts of phosphate.

Phosphorus levels in semi-skimmed cow's milk and fortified soya alternatives to milk. DietPlan7 – 2017 – based on McCance & Widdowson:

- Semi-skimmed pasteurised cow's milk: 94mg / 100ml
- Fortified soya alternative to milk: 48mg / 100ml

Q: Is the calcium found in soya milk "added" calcium or naturally occurring?

A: Naturally occurring calcium in soya drinks is negligible. However, the majority of soya drinks are and soya alternative to yogurts are fortified with calcium. The exceptions are organic versions which have a limited capacity for fortification due to organic food regulations.

Q: Iron bioavailability and plant foods – request for references.

A: Recommended reading:

- Craig, W. Health effects of vegan diets. *Am J Clin Nutr.* 2009;89(suppl):1627S-33S.
- Hunt, J. Bioavailability of iron, zinc and other trace minerals from vegetarian diets. *Am J Clin Nutr.* 2003;78(3):633S-9S.

Q: Are there any concerns regarding the presence of anti-nutrients or mycotoxins with increased consumption of plant-based foods?

A: Anti-nutrients are covered within the webinar – [click here](#) to view the webinar.

Mycotoxins are not exclusive to plant foods, however, there are a couple of studies that suggest mycotoxin exposure may be higher with vegetarian populations. At this stage, the potential increased exposure to mycotoxins (if that is even the case) does not outweigh the benefits of consuming more plants overall.

Specific population groups

Q: How would you translate the evidence to the general population? We know the UK diet is unable to meet the fruit and vegetable recommendations - with poverty in the UK how do we make this diet available to the wider population?

A: Higher costs is a common misconception, however, plant-based diets are cheaper than omnivorous diets. Most of the barriers to consuming more plant foods are around understanding practically how to do it in a way that does not significantly disrupt an individual's usual routine. This is where dietitians and nutritionists can add most value. Additionally, it is important to remember that any level of increase in good quality plant foods accompanied by a simultaneous reduction in animal origin foods will improve health outcomes for individuals.

Pregnancy

Q: Would there be any special or specific advice for pregnant women following a vegan diet and then consequently in a weaning diet?

A: With reference to individuals wishing to follow a vegan diet, a recent paper (see Pistollato below) is highly recommended for a good overview. It reports '*vegan pregnant women have a lower-than-average rate of caesarean delivery, less postpartum depression, and lower neonatal and maternal mortality, with no complications or negative outcomes that are higher than average... plant-based maternal diets could prevent gestational diabetes by providing greater amounts of fibre... in addition, the incidence of preeclampsia appears to be lower among vegan mothers*'.

Also, the British Dietetic Association has recently confirmed that '*it is possible to follow a well-planned, plant-based, vegan-friendly diet that supports healthy living in people of all ages, and during pregnancy and breastfeeding*'.²⁶ That said, while the nutritional requirements of pregnant and lactating women do not differ from their omnivorous counterparts, there are several key nutrients that warrant special consideration for those wishing to follow a vegan diet; the main one being vitamin B12. Others to look at would be iodine, vitamin D, iron and omega-3s.

Vitamin B12: As with the general vegan population, it is essential that pregnant and lactating women take a B12 supplement (this vitamin is only found in foods of animal origin). While B12 fortified foods do exist, a supplement ensures that requirements are consistently met. There is no increment for the UK Reference Nutrient Intake for B12 during pregnancy and therefore it is the same as for adult females at 1.5µg per day.²⁷ During lactation this increases by 0.55µg per day for 0 to 4+ months. The Irish Recommended Daily Allowance is higher at 4µg per day during pregnancy and lactation (versus 3µg per day for non-pregnant adult females).²⁸ It is best not to rely on a pregnancy multivitamin for B12 unless it is chewable or sublingual (dissolves under the tongue).²⁹

It is also prudent to apply this advice to pregnant and lactating women who have been strict vegetarians for a few years, and even omnivores who consume low amounts of animal products. A recent review reported that deficiency of B12 among pregnant women following vegetarian diets ranged from 17-39% depending on the trimester; and in general, higher deficiency was reported in vegans than in vegetarians.³⁰

Recommended further reading:

- Piccoli GB et al. (2015) Vegan-vegetarian diets in pregnancy: danger or panacea? A systematic narrative review.
- Allen LH. Vitamin B12 metabolism and status during pregnancy, lactation and infancy.
- Pawlack, R. (2017) To vegan or not to vegan when pregnant, lactating or feeding young children.

In relation to vegan infants specifically, they only require a B12 supplement if exclusively breastfeeding and the mother's diet doesn't contain adequate amounts. As breast milk or formula consumption reduces when weaning progresses, a B12 supplement should be considered, especially after the first year. Parents planning to raise their baby vegan would benefit from specific advice from a paediatric dietitian.

Recommended further reading:

- Mangels R and Driggers J. The youngest vegetarians: vegetarian infants and toddlers. ICAN. 2012;4(1),pp.8-20. **Although note that advice in the UK/Ireland on plant-based drinks is slightly different to what is included here, in that unless they are specifically formulated to meet the nutritional needs of 1- to 3-year-olds, soya and other plant-based drinks should not be used as a replacement for whole cow's milk as a main drink in the diets of under-2s.*

Q: Do you know of any research on iron deficiency anaemia in pregnancy and plant-based, vegan and vegetarian diets?

A: The [webinar](#) mentions that there is no greater incidence of iron deficiency anaemia in vegetarian populations and in pregnancy iron requirements do not increase materially as the increased demand is met by:

1. Mobilisation of maternal iron stores.
2. Savings made through cessation of menstruation.
3. Increased dietary absorption.

It is theoretically possible for iron intakes to fall short if individuals choose to follow a vegetarian/vegan diet that is not varied and balanced and/or if the mother begins pregnancy with lower iron stores. Unfortunately data is limited on this, but a 2011 British study showed that vegetarians were more likely to have adequate dietary iron intake and to take supplements during the first and second trimesters of pregnancy than non-vegetarians.³¹ As such, it's not a given that pregnant women following a plant-based diet that excludes meat and / all animal origin foods will be iron deficient, just in the same way that's it's not a given that pregnant women following a meat-containing diet will be iron replete.

Q: What would you recommend for an older clientele with poor appetite and difficulties consuming extra bulk/fibre?

A: Looking at plant foods sources of protein, the first thing that springs to mind are nut and seed pastes because they are energy and nutrient-dense and not at all bulky. A swirl of tahini into porridge or some nut butter on toast can add a good amount of calories, protein and minerals.

Tahini is also nice stirred through hot chocolate. You can also blend soaked cashew nuts or silken tofu into soups such as tomato or vegetable, again without adding bulk or lots of fibre. In short, apply the same fortification ideas you would usually recommend and swap them for plant-based alternatives.

Q: I am a renal dietitian, and go for a 1.1g/kg/d protein intake on HD and 1.2g/kg/d on PD. I worry that a plant based diet will not meet these requirements and may result in muscle wasting, potentially malnutrition. Animal protein seems to be a potentially easy way to meet these requirements, particularly in the aging population who predominantly are brought up on meat/fish. I don't know if you have any thoughts on this?

A: For individuals wishing to exclude animal foods, achieve adequate protein while watching potassium, phosphorus etc. could be achieved but it would take some careful planning. A couple of reviews that you may find helpful:

- Gruba-Brzozka, A et al. Vegetarian diet in chronic kidney disease – a friend or foe. *Nutrients*. 2017;9:374.
- Brookhyser Hogan, J. Plant-based diet in kidney disease management. *Dialysis and Transplant*. 2011;40(9):407-9.

Q: Would you recommend a plant-based / vegan diet to clients for CVD?

A: Plant-based diets are definitely beneficial to heart health. There is strong and consistent evidence that a plant-based diet significantly reduces the risk of CVD, generally by as much 20-40%. That is why cardio-protective diets are generally plant-based in their recommendations already.

Additionally, the webinar discusses the benefit of plant-based diets for weight management, which would be of value to individuals who are at risk of or with CVD and at an unhealthy weight.

Recommended reading:

- Kahleova, H et al. Cardio-metabolic benefits of plant-based diets. *Nutrients*. 2017;9(8),848.
- Ferdowsian, H and Barnard, N. Effects of plant-based diets on plasma lipids. *Am J Cardio*. 2009;104:947-956.

Protein shakes and powders

Q: What is your view of supplementary protein powder use? Very commonly promoted in gyms etc.

A: I think it really depends on the individual and whether they can get enough protein through food alone. This should be achievable for all but the most committed of body builders / intensive trainers.

Q: Is there any emerging research comparing whey protein and pea protein for muscle protein synthesis in high performance athletes?

A: Recommended reading:

- Babault, N. et al. Pea protein oral supplementation promotes muscle thickness gains during resistance training: a double-blind, randomized, placebo-controlled clinical trial vs. whey protein. *J Int Soc Sports Nutr*. 2015;12:3.
- van Vliet, S. et al. The skeletal muscle anabolic response to plant- versus animal-based protein consumption. *Journal of Nutrition*. 2015;145(9):1981-91.

Recommended recipe resources

Q: What resources do you recommend for plant-based recipes?

A:

- Forks Over Knives is a good place to start (www.forksoverknives.com)
- For cook books I'd recommend Anna Jones, who also writes regularly for the Guardian Cook Magazine and Green Kitchen Stories.

Miscellaneous

Sustainability

Q: Do these calculations account for the fact a person needs to consume more plant based foods to achieve the same nutrient equivalent of meat?

As mentioned in the [webinar](#), specifically in relation to weight management, the benefits of plant-based dietary patterns have been attributed to a *different* nutrition composition than meat-containing diets, namely lower energy density, lower fat and higher fibre contents. In other words, we do not need to match the nutrition composition of meat with plants when we remove it from the diet. Looking at this the other way, we don't aim to achieve the nutritional equivalent of plant proteins when consume meat instead, looking at fibre as an example.

Potatoes

Q: Why are potatoes classified as unhealthy and part of the unhealthy plant-based diet?

A: The diet quality study referred to in the webinar specifically listed *French fries, baked or mashed potatoes, potato or corn chips* as less healthy plant foods. Baked or mashed potatoes we presume were included in this grouping because of their high glycaemic index and glycaemic load (see www.glycemicindex.com for values), however, national and international dietary guidelines all support the consumption of potatoes which have been prepared without the addition of fats, this includes baked / jacket potatoes as they are a good source of fibre.

¹ Norris J and Messina V. *Vegan for Life*. 2011. Boston: Da Capo Press, pp. 32.

² Public Health England. *Government dietary recommendations: government recommendations for energy and nutrients for males and females aged 1-18 years and 19+ years*. 2016.

³ Food Safety Authority of Ireland. *Recommended daily allowances for Ireland*. 1999.

⁴ <https://www.vegansociety.com/resources/nutrition-and-health/nutrients/vitamin-b12>

⁵ Pawlak R et al. How prevalent is vitamin B12 deficiency among vegetarians. *Nutrition Reviews*, 2014; 71(2),pp.110-17.

⁶ Ho-Pham L et al. Effect of vegetarian diets on bone mineral density: a Bayesian meat-analysis. *Am J Clin Nutr*. 2009;90:943-50.

⁷ Norris J and Messina V. *Vegan for Life*. 2011. Boston: Da Capo Press, pp. 44-7.

⁸ US food based dietary guidelines 2015-2020 – food groups:

<https://health.gov/dietaryguidelines/2015/guidelines/chapter-1/a-closer-look-inside-healthy-eating-patterns/#food-groups>

⁹ PHE. UK Eatwell Guide 2016. <https://www.gov.uk/government/publications/the-eatwell-guide>

¹⁰ Dutch dietary guidelines 2016:

http://www.voedingscentrum.nl/Assets/Uploads/voedingscentrum/Documents/Consumenten/Schijf%20van%20Vijf%202016/VC_Richtlijnen_Schijf_van_Vijf_2016.pdf (in Dutch)

¹¹ Messina, M. Soy and health update: evidence of the clinical and epidemiologic literature. *Nutrients*. 2016;8(12), pp.E574

¹² <http://www.aicr.org/foods-that-fight-cancer/tab-content/soy-research-1.html>

¹³ WCRF Intern. CUP Report: Diet, Nutrition, Physical Activity, and Breast Cancer Survivors. 2014. www.wcrf.org/sites/default/files/Breast-Cancer-Survivors-2014-Report.pdf.

¹⁴ EFSA Panel on Food Additives and Nutrient Sources added to Food. Risk assessment for peri- and post-menopausal women taking food supplements containing isolated isoflavones. *EFSA J* 2015;13(10):4246. <http://onlinelibrary.wiley.com/doi/10.2903/j.efsa.2015.4246/pdf>

¹⁵ Hamilton-Reeves JM et al. *Fertil Steril* 2010;94(3):997-1007

¹⁶ Mitchell JH et al. *Clin Sci (Lond)* 2001;100(6):613-8

¹⁷ Beaton LK et al. *Fertil Steril* 2010;94(5):1717-22. 122

¹⁸ Zung A et al. *J Pediatr Endocrinol Metab* 2010;23(1-2):133-41

¹⁹ Nissinen M, Gylling H, Vuoristo M, et al. Micellar distribution of cholesterol and phytosterols after duodenal plant stanol ester infusion. *Am J Physiol Gastrointest Liver Physiol*. 2002;282:G1009-G1015.

²⁰ Gylling H, Plat J, Turley S, et al. Plant sterols and plant stanols in the management of dyslipidaemia and prevention of cardiovascular disease. *Atherosclerosis*. 2014;232:346-360

²¹ Messina M. Insights Gained from 20 Years of Soy Research. *J Nutr* 2010;140:2289S–2295S.

²² Oseni T, Patel R, Pyle J, et al. Selective estrogen receptor modulators and phytoestrogens. *Planta Med*. 2008;74:1656-65.

²³ Speirs V, Carder PJ, Lane S, et al. Oestrogen receptor beta: what it means for patients with breast cancer. *Lancet Oncol*. 2004;5:174-81

²⁴ McCarty M et al. Bioavailable dietary phosphate, a mediator of cardiovascular disease, may be decreased with plant-based diets, phosphate binders, niacin, and avoidance of phosphate additives. *Nutrition*. 2014;30(7-8):739-47.

²⁵ Cupisti A et al. Phosphate control in dialysis. *Int J Nephrol Renovasc Dis*. 2013;6:193-205.

²⁶ https://www.bda.uk.com/about/workwithus/bda_vegan_society_mou

²⁷ COMA. Dietary reference values for food energy and nutrients for the United Kingdom. 1991. London: Department of Health, pp.107.

²⁸ Food Safety Authority of Ireland. Recommended daily allowances for Ireland. 1999, pp.21.

²⁹ Norris J and Messina V. *Vegan for Life*. 2011. Boston: Da Capo Press, pp. 140.

³⁰ Pistollato, F et al. Plant-based and plant-rich diet patterns during gestation: beneficial effects and possible shortcomings. *Advances in Nutrition*. 2015;6:581-91.

³¹ Alwan N et al. Dietary iron intake during pregnancy and birth outcomes in a cohort of British women. *Human Reproduction*. 2001;26(4):911-19.