IS FRESH ALWAYS BEST?

LIFE EDUCATION
Learning with Harold

Summary

Levels of nutrients like vitamins can be changed by storing and processing fruit and veges. Many plants start to lose vitamin B and C once they're picked: stored spinach can lose all its vitamin C in a week. Freezing fresh fruit and veg can reduce how much Vitamin B and C they lose, and even increase vitamin E levels. In other plants, storage increases levels of Vitamins A or D.

Cooking fresh plants can also cut their Vitamin B and C levels by around 15% to 50%. Just how much depends on the plant and how it was cooked. Canned plant foods lose about 60% of their Vitamin B and C compared to fresh. But many canned vegetables concentrate minerals like calcium or sodium, and canned tomatoes may contain more Vitamin E.

Aim for a mix of very fresh, chilled, frozen and canned foods, cooked in many ways.

What happens to vitamins when we store fruit and vegetables?

Levels of water-soluble vitamins like B and C start to fall at different rates after we pick some plants: fresh spinach stored at 20 °C for a week loses 100% of its Vit C (Vitamin C), but carrots only 27%; refrigeration at 4 °C slows down these losses (to 75% and 10%, respectively), as does flash freezing vegetables like peas right after harvesting. But other plants (like pumpkins and mushrooms) only develop higher levels of carotenes (coloured substances related to Vitamin A) or fat-soluble vitamins like A and D after they've been kept for a while.

How do frozen and refrigerated vegetables and fruits compare?

A 2015 study found certain stored frozen foods (like corn, green beans and blueberries) had higher Vit C levels than the same refrigerator-stored fresh food. There was no major loss of Vit C for frozen strawberries, carrots, spinach, peas or broccoli. For vitamin B2 the results were similar except that frozen peas lost more than refrigerated ones. Beta-carotene (from which we make Vitamin A) levels were 50% lower in frozen peas, carrots and spinach than in refrigerated but no different for beans and broccoli. Vit E levels were up to 50% higher for frozen peas, beans, blueberries, spinach and corn.

What happens when we cook fruit and vegetables?

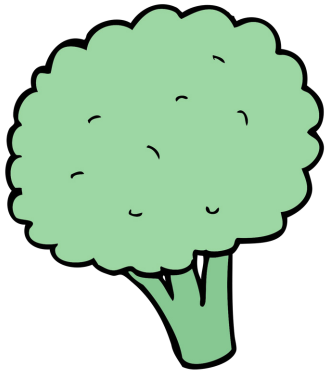
Most cooking techniques like boiling or baking break down water soluble vitamins so they're less helpful to us. Home cooking causes a 15% to 55% loss of Vit C depending on plant type and method. Microwaving, boiling and steaming generally cause least loss and frying the most, but it varies. Boiling carrots concentrates their beta-carotene but can damage other nutrients. The nutrients that leak out of plant cells into cooking water aren't totally wasted if you use this liquid in a sauce, stew or soup. But if you peel plants before cooking them, remember you're also removing some of their nutrients: about 90% of the iron, 70% of the fibre, and 30% to 50% of the B and C vitamins in a potato are in its skin.

How do frozen and canned fruits and vegetables stack up?

Blanching* before freezing or canning can damage sensitive vitamins like B and C. Vit C losses average around 50% for freezing and over 60% for canning. And because picked plants – even refrigerated ones – naturally lose Vit C, frozen produce can end up containing similar amounts of Vit C to fresh foods which have been stored for a while. Canned tomatoes often have more Vit E than fresh or frozen ones, but levels are similar for other vegetables. Canned veges often take up minerals (like calcium) from water during processing so may have more than fresh. But they often also have added sodium (brine) – and tinned fruits may come in sugary syrups. It's good to check can labels and aim for low or no sodium and sugar products, and maybe drain or rinse what's inside before eating it.

So what's the best trade-off?

By the time we balance vitamin losses during storage against those from freezing or canning and cooking, most cooked fresh vegetables will contain similar levels of nutrients like Vit C and beta-carotene (from which we make Vit A) to cooked frozen or canned ones. Although fresh is good, it's not always practical or economical: a variety of fresh, chilled, frozen and canned produce, prepared in a range of ways should provide most of the nutrients we need in a balanced diet.



*Briefly putting food in boiling water or steam to stop the enzymes that break it down from working.

USEFUL LINKS

See the Life Education factsheets on individual vitamins, especially A, B, C and E as these also cover how storage and processing affect them. The sheets on Processed foods and processing, Tricky ingredients, Sodium and Sugars also contain relevant information.

REFERENCES

Bouzari et al.,28 January 2015. "Vitamin Retention in Eight Fruits and Vegetables: a Comparison of Refrigerated and Frozen Storage." Journal of Agricultural and Food Chemistry 63(3):957-62. doi: 10.1021/jf5058793. Retrieved from: http://www.affi.org/assets/resources/public/2014-bouzari-et-al-vitamin-retention-in-8-f-v-140.pdf 26 September 2017

Miglio, Christina et al., 2008. "Effects of Different Cooking Methods on Nutritional and Physicochemical Characteristics of Selected Vegetables". Journal of Agricultural and Food Chemistry 56: 139-147. Retrieved from: http://pubs.acs.org/doi/pdf/10.1021/jf072304b 27 September 2017.

Rickman et al., 14 March 2007. 'Nutritional Comparison of Fresh, Frozen and Canned Fruits and Vegetables. Part 1. Vitamins C and B and Phenolic Compounds." Journal of the Science of Food and Agriculture 87: 930-944. doil: 10.1002/jsfa.2825. Retrieved from: http://ucce.ucdavis.edu/files/datastore/234-779.pdf 27 September 2017.

Rickman et al., 14 March 2007. 'Nutritional Comparison of Fresh, Frozen and Canned Fruits and Vegetables. Part II. Vitamin A and Carotenoids, Vitamin E, Minerals and Fiber." Journal of the Science of Food and Agriculture 87: 1185-1196. doi: 10.1002/jsfa.2824. Retrieved from: http://ucce.ucdavis.edu/files/datastore/234-778.pdf 27 September 2017.