

Q&A

David W. Plank

WRSS Food & Nutrition Insights

Managing Principal, WRSS Food & Nutrition Insights®

Dietary fiber is a nutrition component in foods that improves population health around the world. Many studies have shown that it increases longevity and quality of life by reducing the risk of heart diseases, forms of cancer, type II diabetes, and other diseases.

Why is measuring dietary fiber important?

"There are two main reasons for measuring dietary fiber. The first is from a public health standpoint. Dietary fiber is a nutrition component which improves population health worldwide. There have been many clinical studies which have shown the benefits of dietary fibers in the reduction in heart diseases, various cancers, type II diabetes, and other diseases, resulting in improved population health and longevity. So, quantifying the dietary fiber content in food products is an important step in providing consumers the information they need for choosing healthier foods for themselves and their families.

The second reason is that regulatory bodies around the world have also recognized the importance of dietary fiber for developing a healthy population and have granted health claims based on the scientific literature for food products containing higher levels of dietary fibers and particular types of dietary fibers to encourage greater consumption. The health claims and labelling advantages granted to food manufacturers provide a competitive advantage in the marketplace and further justification for measuring dietary fiber and fortifying with dietary fiber to benefit consumer health and attractiveness of the food product."

How do you analyse dietary fiber?

"Surprisingly, in the US, you do not analyse dietary fiber, but around the world, it does vary. In the US, they now define the analytical methods for dietary fiber as measuring non-digestible carbohydrates. Whether a non-digestible carbohydrate may be labelled as dietary fiber is determined by the Food and Drug Administration (FDA) based on physiological benefits which have been demonstrated for a particular dietary fiber through peer-reviewed clinical evidence. Dietary fiber listed on the nutrition facts label for foods in the US is determined by reconciling the non-digestible carbohydrates measured with an approved analytical method against the known amount of FDA-approved dietary fiber formulated into the food product.

The official analytical methods used for dietary fibers and non-digestible carbohydrates are published by the Association of Official Analytical Chemists (AOAC), which was once part of the FDA in its former history. The FDA and most of the regulatory regions around the world default to AOAC official methods for measurement of the nutrient content of foods. Neogen and Megazyme have been responsible for leading the development of all the modern dietary fiber and non-digestible carbohydrate measurement methods currently approved by AOAC.

So, to finally answer your question, the way you measure dietary fiber or non-digestible carbohydrates in a food product is to use an AOAC official method. All current AOAC methods determine dietary fiber and non-digestible carbohydrates by removing through enzymatic digest, chemical separation, or measurement, all components which are not dietary fiber or non-digestible carbohydrate present in the food and determining what remains. All the common dietary fiber methods for human foods, rely on a similar approach. Where the official methods differ is in their digest conditions. The evolution of dietary fiber and non-digestible carbohydrate official methods has really been about the improvements of the enzymatic digestion conditions to simulate human digestion more closely. This is where the expertise of Megazyme in the field of enzymology and digestion methodologies has most directly benefited the field of dietary fiber measurement."



How is dietary fiber regulated?

“Dietary fiber is regulated by health authorities in different regions around the world. Almost all regions recognize the Codex Alimentarius definition of dietary fiber. But every region has slightly different regulations regarding dietary fiber. As an example, the default regulation in most regulatory regions like the EU or Asia is for the dietary fiber caloric content of all dietary fiber components to count as 2 calories per gram regardless of whether it is total dietary fiber, insoluble dietary fiber, or soluble dietary fiber. So, distinguishing between insoluble, soluble, and total dietary fiber content from a caloric perspective in these regions is not necessary unless there is a specific health claim related to one of these fractions.

However, in the United States, insoluble dietary fiber is counted as zero calories per gram, soluble dietary fiber is counted as two calories per gram, and, if you use an analytical method which does not distinguish insoluble and soluble fiber, then total dietary fiber counts as 4 calories per gram. This means that in the US jurisdiction, it is important to use an AOAC official method which measures both insoluble and soluble dietary fibers so that you can gain an advantage relative to competitors for lower caloric content. This regulatory rule also drives US manufacturers toward the utilization of insoluble dietary fiber when fortifying in foods in a calorie competitive category.

Another area of difference in regional regulations of dietary fiber is found in how total carbohydrates in the food are calculated. In the US, dietary fiber is included in the sum of total carbohydrates. One of the major trends in the US market are “keto-friendly” food products which primarily translates to foods which are low in net carbohydrates. Keto-friendly diets in the US subtract dietary fiber from total carbohydrates to determine net carbohydrates. Higher dietary fiber yields lower net carbohydrates and therefore provides a more keto-friendly food and a marketing advantage. However, in regions like the EU and FSANZ (Australia / New Zealand), total carbohydrates already have dietary fiber subtracted from the sum. So, when US recommendations for calculating net carbohydrates are used in these regions, they over correct and yield misleading information regarding the keto-friendly ranking of the food.

The take home from both examples is that it is important for food manufacturers to understand the local regulations for dietary fiber where they manufacture and where they intend to distribute their food products. Knowing these regulations can have an important impact on the product labelling compliance for the region and prevent misleading consumers.”

What are the risks of incorrect dietary fiber labelling and how to ensure products are compliant?

“Universally, if you are making a health claim based on dietary fiber content, then you are required to perform dietary fiber testing to validate that you have the amount of dietary fiber you are claiming. In the US, the consequences of mislabelling are much higher than many other areas of the world. In the US, there is a high level of litigiousness, and there are expensive class action lawsuits which can be brought by opportunistic consumers and attorneys if you mislabel the dietary fiber content on your package. Additionally, regulatory agencies which find that your product is inaccurately labelled may deem it misbranded and require the product to be recalled as well as levelling other financial penalties.

You also could be out of compliance with regulatory agencies and deemed misbranded if you are fortifying with dietary fiber in a food product to make a dietary fiber content claim. In the US, you must have 100% or more of the amount of dietary fiber you claim on the nutrition facts label if you have fortified the food product with dietary fiber. This makes it critical to recover as much of the dietary fiber with which you fortified to assure that you are not misbranding the product. Using an official AOAC method which maximizes dietary fiber recovery reduces the need to overfortify the food above the claimed level which could be costly for you as the food manufacturer.”

In your opinion, which method is most suitable to measure dietary fiber?

“The best general method to select for dietary fiber is AOAC official method 2022.01. This is a method which was developed at Megazyme and recently approved as an official method by AOAC in 2022. The AOAC 2022.01 method measures both soluble and insoluble dietary fiber, which is important for the US regulatory region, and it uses digest conditions which are more like human digestion conditions than any of the predecessor dietary fiber methods. The AOAC 2022.01 digest conditions are like those of the English starch method, a method used for measuring starch availability which has been shown to have a high correlation to human glycaemic response. Glycaemic response reduction is one of the physiological health benefits of dietary fiber that the FDA recognizes for demonstrating a non-digestible carbohydrate as a true dietary fiber. The AOAC 2022.01 is the best general method for getting the highest yield of all dietary fiber components in a food product. Relying on a dietary fiber method which has a good correlation to human digestion is helpful in reducing measurement of artifacts which may not be true dietary fibers and result in regulatory or consumer actions.

If you are in a regulatory region like the EU or FSANZ where you may not need to distinguish between insoluble and soluble dietary fibers, then you will find that the AOAC official method 2017.16 will serve you best as a general method. The AOAC 2017.16 method uses the same digestion methodology as AOAC 2022.01 without the individual quantification of the insoluble and soluble fractions.

There are also many older dietary fiber methods which are allowed to be used in various regulatory regions and some of these may even give a higher yield of certain dietary fibers in your food product. However, it is important to bear in mind that these higher yields may be artifacts of a digest which is less like human digestion. Claiming dietary fiber content resulting from an analytical method digestion artifact may leave the food manufacturer exposed to claims of labelling “fake fiber” and an important risk to consider when selecting a dietary fiber method.”