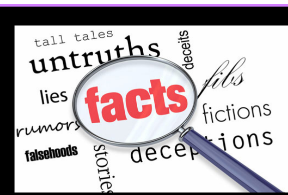
MYTH & FACTS ABOUT FOOD IRRADIATION



Myth

"Irradiation is too effective and irradiation is not effective enough."

Reality:

This statement is incorrect. The effects of irradiating food are proportionate to the dose, and the dose is controlled during the process. Therefore, the effectiveness of irradiation is defined for each specific application.

This myth appears to be two myths that are strung together for convenience, but that is not the case. The myth is based on the argument that irradiation is too effective because, since it can be used to kill all pathogens, then it will be used to replace all Good Manufacturing Practices including sanitation. And, at the same time, if it is not used to kill all of the pathogens, then it is not effective enough.

There are many methods for reducing pathogens in food. A specific method only kills a percentage of the pathogens when properly applied. This is common for chemicals used during the processing of the food, and/or as additives applied to the food. For example, washing the food in highly chlorinated water will reduce the pathogens, but not eliminate them. There are also several methods for eliminating pathogens in food. For example, canning, when applied properly, will kill all of the pathogens. We do not hear that pathogen reduction techniques "are not effective enough" and, similarly we do not hear that pathogen elimination techniques "are too effective". For most processes, there are threshold conditions. If the conditions are not met, such as chemical concentration or temperature or pressure etc., then the effect on the pathogens is inconclusive.

Irradiation has its advantages and its disadvantages. One clear advantage is that the effect on pathogens is proportional to the irradiation dose to those pathogens. However, the correlation of the effect from the dose is not linear, but logarithmic. If a specific dose reduces the pathogen population from 100 to 10 in a sample of product, and you double that dose, the pathogens are reduced to 1. If you triple the original dose, then there would only be 0.1 pathogens surviving (or one pathogen in ten samples of product). We refer to the dose required to reduce the population of a specific pathogen by a factor of 10, the "Dvalue", the letter "D" representing "decimal reduction", or factor of 10. If you give a product the Dvalue dose, you will reduce the pathogen by one "log" (another way of saying a factor of 10). Therefore doubling the dose results in a "two log reduction". Tripling: a "three log reduction", etc.

Consequently, you can customize the dose based on the population of target pathogens. You can use the process as a pathogen reduction technique by applying perhaps a one log reduction (a 90% effective kill) or two log reduction (99%). This may be employed in conjunction with other pathogen reduction techniques. Or, you can use it as a technique to kill all of the pathogens, "sterilizing" the product similar to canning; a twelve log reduction (99.9999999999%). More commonly, the process is used to "pasteurize" the product, which is typically a five log reduction (99.999%).

The cost of the process is somewhat proportional to the dose. The higher the dose the higher the cost. Also, if there are any negative effects on the product from irradiation there may be a dose that cannot be exceeded. Thus, there are definite advantages in keeping the dose as low as practical as long as they are sufficient for achieving the intended purpose of the irradiation. For products that have a pathogen requiring a dose that has a negative effect on a specific product or a dose that costs too much for the market to bear for that product, then the process will not be used on that specific product.

Is irradiation too effective? Is irradiation not effective enough? Irradiation is as effective as it needs to be.

Russell N. Stein
GRAY*STAR, Inc.
www.GrayStarInc.com
GrayStarGenesis@aol.com