

Fortification of Food for Value Addition : Prospects and Constraints

Vimla Dukwal

Department of Food and Nutrition

College of Home Science

**Rajasthan Agricultural University Bikaner
(Rajasthan)**

- All agricultural raw materials are processed before they can be used as foods.
- In processing stages, some portion of the nutrients is destroyed.
- **Enrichment** – addition of specific nutrients to a food (FDA, 1943).
- **Restoration** – Replacement of nutrients loss in processing foods.

Contd.

Contd.

- **Supplementation** : any foods or nutrients or a mixture of both used to improve the nutritive value.
- **Nutrification**: Addition of nutrients to the food at such level as to make major contribution to food.
- Addition of specific nutrients I.e. milk or flour
- Excess amount to be added.
- Selection of appropriate carrier for nutrients.

Objectives

- **To maintain the nutritional quality of foods.**
- **Keeping nutrients levels adequate to correct or prevent specific nutritional deficiencies in the population or in groups at risk of certain deficiencies.**
- **To increase the added nutritional value of a product (commercial view).**
- **To provide certain technological functions in food processing.**

Advantage of fortification

- Food fortification does not require people to change their eating habits thus it is socially acceptable.
- The effect of fortification is both fast and broad.
- Fortification does not affect organoleptic properties.
- Food fortification is the safest strategy as the added nutrient is provided in the diet is low but constant amounts.
- Way to deliver necessary amounts of micronutrients.

Contd.

Contd.

- **Fortification is the most cost effective approach to prevent nutrient deficiencies.**
- **It can be introduced quickly through existing marketing and distribution system.**
- **Benefits of fortification are readily visible.**
- **Food fortification is sustainable as it is socially acceptable.**
- **In addition, fortification will reach secondly target risk groups, such as the elderly, the all and those who have an unbalanced diet.**

Limitations of fortification

- **A thorough knowledge of dietary habits and nutrient intake in the target group(s).**
- **A complementary educational programme is required particularly when the fortification influences organoleptical characteristics of the food.**
- **Food fortification is not the ultimate solution of a nutritional deficiency**

Fortification programme design

- Identification of the target group.
- Identification of the nutrient to be added.
- Selection of foods to reach the vulnerable i.e. target group.
- Level of nutrient to be added.
- Execution of test protocol - laboratory testing, bioavailability and pilot trials.

Criteria for selecting the vehicle for food fortification

- Food fortification is appropriate when there is demonstrated need for increasing the intake of essential nutrients in one or more population groups.
- The fortified food must be consumed by a large section of the population, especially those at greatest risk of deficiency.
- Relatively little inter and intra individual variations occurs in the amount of the fortified food consumed. This will ensure that nutrient intakes remain within a safe range.
- The essential nutrient(s) should be present in amounts that are neither excessive nor insignificant, taking into account intake from other dietary sources.

Contd...

Contd...

- **The nutrient(s) added should not adversely affect the metabolism of any other nutrient.**
- **The nutrient's added should be sufficiently stable in the food under customary conditions of packaging storage, distribution and use.**
- **The nutrient(s) added should be physiologically available from the food.**
- **The nutrients added should not impart undesirable characteristics to the food and should not unduly shorten shelf life.**
- **The fortified food must be through central processing in which nutrients can be added under controlled conditions and minimum cost.**
- **The additional cost of the fortification should be reasonable for the consumers.**

Fortification technology

Dry mixing : for foods like cereal flours and their products, powder milk, beverage powder etc.

Dissolution in water : for liquid milk, drinks, fruit juices, bread, pastas, cookies.

Spraying : for corn flakes and other processed foods requiring cooking or extrusion steps that would destroy vitamin activity.

Dissolution in oil : for oily products such as margarine.

Contd...

Contd...

Addition : For sugar fortification vitamin A in powder form is absorbed on to the surface of the sugar crystals when used with a vegetable oil.

Coating : For rice. The vitamins sprayed over the grains must be coated to avoid losses when the grains are washed before cooking.

Pelleting : for rice. The vitamins are incorporated into pellets reconstituted from broken kernels.

Constraints

Vitamin A

- Moisture contents
- Repeated heating
- Hygroscopic foods
- Status of individual
- Dietary composition

Iron

- 📄 Food rich in phytate
- 📄 Suitable technologies
- 📄 Tannins present in chocolate breakfast drinks
- 📄 Fat based foods, salt and sugars
- 📄 Low acid content of food
- 📄 Long term risk for male than female

Iodine

- 📄 Iodine stability
- 📄 Periodic checking
- 📄 Mandatory certification

Conclusion

- 📌 **Vitamins are very sensitive to external factors such as humidity, heat, oxygen, pH, light, oxidizing and reducing agents.**
- 📌 **Some losses must therefore be expected during food processing and storage.**
- 📌 **A part from using a process that causes minimal losses and packaging material that gives maximum protection**
- 📌 **The food industry must add extra amounts of the vitamins to compensate for those losses and to ensure that the finished products has at least the amounts declared on the label during its normal shelf life.**



Thanks