

FORTIFICATION

The fortification of industrially-milled cereal grains

by Milan Shah, Henry Simon Milling

As supplier of cereal-based foods products, flour millers have a responsibility to help feeding the world in healthy and enriched ways. In addition, they can have a role in prevention of chronic diseases such as iron deficiency anemia and birth deficits.

Despite this, according to the Food Fortification Initiative currently globally only 82 countries have legislation to mandate fortification of at least one industrially milled cereal grain, while there are about 195 countries in the world today. In addition, eight countries fortify more than half of their industrially milled wheat flour through voluntary efforts and these countries include Afghanistan, the Democratic Republic of Congo, Gambia, Lesotho, Namibia, Qatar, Swaziland, and the United Arab Emirates.

Most of these countries mandate fortification of wheat and maize flour with iron and folic acid. Very recently, The National Fortification Alliance of Pakistan (NFA) is partnering with the United Nations World Food Program (WFP) and the government of Australia to launch a pilot project to fight malnutrition by fortifying wheat flour in Islamabad and Rawalpindi.

According to the World Health Organisation (WHO) and Centres for Disease Control and Prevention, CDC; Iron deficiency anemia is the most widespread nutritional deficiency in the world and has important consequences for child development and enormous economic costs.

Likewise, according to WHO, CDC and the International Clearing House for Birth Defects Surveillance and Research (ICBDSR), neural tube defects are among the most common structural congenital anomalies worldwide, with an estimated 300,000 cases-per-year.

Obviously, the best way of preventing micronutrient malnutrition is to ensure consumption of a balanced diet that is adequate in every nutrient. Unfortunately, this is far from being achievable everywhere since it requires universal access to adequate food and appropriate dietary habits.

From this standpoint, food fortification has the dual

advantage of being able to deliver nutrients to large segments of the population without requiring radical changes in food consumption patterns.

Definitions of food fortification and flour fortification

There always has been confusion between enrichment and fortification terms and most of the times, they are used interchangeably. Pylar and Gorton describe “enrichment” as the practice of adding back vitamins and minerals lost during processing, while “fortification” as supplementation involves with nutrients not previously present in the food or not naturally occurring at such high levels.

They also indicated that enrichment describes the addition of the B-vitamins and iron to flour because losses in these materials range from 60-to-800 in flours with an extraction rate of 7/0-to-759h.

WHO/FAO defines food fortification as “the addition of one or more essential nutrients to a food, whether or not it is normally contained in the food, for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrients in the general population or specific population groups”.

This process usually takes place during the processing of staple foods at a central level so that it reaches a considerable proportion of the at-risk populations without requiring their active participation.

Flour fortification adds nutrients to flour to help people thrive throughout their lives

Food fortification is one of the leading public health interventions recommended to prevent and control micronutrient deficiencies. Staple foods and condiments are among the foods most commonly fortified with vitamins and minerals.

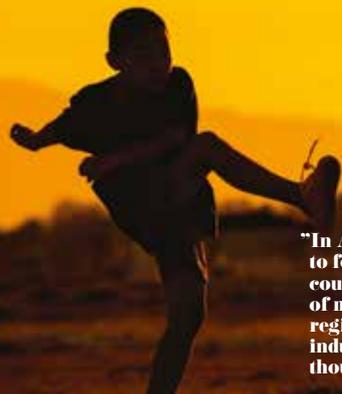
Wheat flour was the first cereal grain product to be widely fortified, and the first cereal grain recommendations issued by the WHO pertained to maize and wheat flour.

Fortification of industrially processed flour, when appropriately implemented, is an efficient, simple and inexpensive strategy for supplying vitamins and minerals to the diets of large segments of the population. Adding iron to flour during the milling process helps reduce the risk of iron-deficiency anemia and wheat flour is the staple most commonly fortified with iron in large-scale fortification programmes.

The mandatory fortification of wheat flour with iron significantly furthers the reduction in the prevalence of inadequate iron intake, except among women of reproductive age. Therefore, monitoring of iron fortification in flour is essential to assess compliance to the fortified flour policy and to guarantee a safe iron intake for all the population.

Iron, zinc, folic acid (B9), thiamine (B1), riboflavin (B2), niacin (B3), B12, vitamin A and vitamin D are minerals and vitamins commonly used in flour fortification. The most common practice is to add multiple vitamins and minerals using a single ingredient called a premix and premix includes: fortificants (powdered vitamins and minerals), excipients (carriers, fillers), and free-flow agents.





"In Africa, 26 countries have mandates to fortify wheat flour. Nine of these countries also require fortification of maize flour. Six countries in this region fortify more than half of their industrially milled wheat flour even though it is not mandatory."

Premix manufacturers usually include nutrients at levels approximately 290 to 59p higher than listed on the label. This accounts for potential nutrient loss and ensures that the premix meets the label claims.

During fortification process in the mill, use of micro-dosing and proper mixing mechanism are important for correct amount and uniform distribution of fortification agents in flour. The most common way to fortify flour is to use the equipment called feeders or in practice as micro-doser machines, which is used at the flour blending stage just before packaging operation.

This adds premix to flour precisely at pre-determined rates in the process of flour production. The micro-doser device is easily reachable, in that it is supplied by Alapala, Henry Simon and other leading milling equipment manufacturers.

Three types of feeders are available: screw, revolving disk and drum or roller. Mills generally need one feeder for each type

of flour or meal line to be fortified, and the size and number of feeders needed depends on the amount of flour produced-per-hour.

The operating principle of the micro-doser unit is basically the pre-mixing of product and ingredients with a steel palette mixer, then adding in flour delicately in increments with a discharge mechanism. The unit is also electronically controlled for sensitive adjustment of feeding speed and amount according to the process required and used.

An example of the global grain fortification progress: Africa

In Africa, 26 countries have mandates to fortify wheat flour. Nine of these countries also require fortification of maize flour. Six countries in this region fortify more than half of their industrially milled wheat flour even though it is not mandatory.

In early 2011, FFI conducted an exhaustive analysis of flour fortification opportunities in Africa and found that seven countries were fortifying at least 75% of their industrially milled wheat flours.

FFI believes that currently 19 countries are fortifying at least 75% of their industrially milled wheat flours with at least iron and folic acid at levels that are expected to make a healthy impact. In Africa, South Africa and Nigeria were the first two countries to fortify flour.

Future strategies

Wheat flour fortification is a preventive food-based approach to improve micronutrient status of populations overtime that can be integrated with other interventions in the efforts to reduce vitamin and mineral deficiencies when identified as public health problems.

Wheat flour fortification programmes could be expected to be most effective in achieving a public health impact if mandated at the national level and can help achieve international public health goals.

Decisions about which nutrients to add and the appropriate amounts to add to fortify flour should be based on a series of factors including the nutritional needs and deficiencies of the population; the usual consumption profile of "fortifiable" flour (i.e. the total estimated amount of flour milled by industrial roller mills, produced domestically or imported, which could, in principle, be fortified); sensory and physical effects of micro-ingredients on flour and flour products; fortification of other food varieties; population consumption of vitamin and mineral supplements; and costs.

Flour fortification programmes should include appropriate Quality Assurance and Quality Control (QA/QC) programmes at mills as well as regulatory and public health monitoring of the nutrient content of fortified foods and assessment of the nutritional/health impacts of the fortification strategies.

In conclusion, as flour millers we have a responsibility to feed billions of people throughout the world, not only satiate them but also make healthier. Fortified foods have health and nutrition value added so they will significantly increase the competitiveness of the industry.

www.henrysimonmilling.com



Peter Marriot, Henry
Simon Milling Sales
Manager