

Food grading systems have evolved since the manual testing and tasting which were reserved for the top paying customers in the market. Quality has emerged as the basic factor for product selection and grading of fresh and processed produce has become a pre-requisite for the food industry.

Food grading involves the inspection, assessment, and sorting of various foods regarding quality, freshness, legal conformity and market value. Food grading often occurs by hand, in which foods are assessed and sorted. Machinery is also used to grade foods, and may involve sorting products by size, shape and quality.

While the core function of food grading remains the maintenance of food safety and hygiene, the need for a wider applicability has emerged due to the enhancement of logistics and food distribution networks which enables a wider range of food products across categories and geographies to be distributed. The recent awareness about health & wellness has also augmented the application of food grading to include Health Impact and nutritional values. Furthermore, due to the vast network of food distribution in operation globally, the traceability of food has emerged as a key end use applicability of Food Grading Systems.

Owing to the above evolution, food grading has evolved into a steadily evolving sector of food processing and entails a globally active R&D and innovation efforts at different stages of the value chain.

Food grading systems vary depending on the food group and also the country of consideration and are often customised as per environmental and prevailing consumer requirements. The food grading systems can be classified as following depending on the stage of grading in the particular food group value chain:

1. Production: This stage refers to the farming stage of the perishable food group (in case of meats and other farm produce) and raw material stage for various processed food groups. At this stage the food can be graded on
  - a. Input Materials: Grass Fed Meats, Pesticide Free or Organic vegetables and fruits are some of the grade distinctions applicable at this stage.
  - b. Quality: Size, Weight and Appearance are key quality parameters observed for foods like Meats and Fruits & Vegetables at this stage and depending on the end usage requirements, they are segregated further down the value chain for usage in direct to Retail (for higher grades) or to Processing (for lower grades).
  - c. Nutritional Value: Low GI (Glycemic Index) Grains, Low sodium vegetables etc. are some of the nutritional grades utilised at this stage to differentiate and up-segment the produce.
2. Processing: This stage refers to the mechanical or chemical modulation to the raw material to create value added products. Bakery, Dairy, Processed meats are some of the largest categories in the GCC region as well as globally for food processing. At this stage the food can be graded on
  - a. Processing Efficiency: Low Ignition (Fast Frying) Oils, Extrusion Ready Grain Mix etc. are some examples of grading raw material on Processing Efficiency.
  - b. Packaging Efficiency: Bite Size Chips, Low Purge beverages etc. are grading examples where efficiency of packaging defines the grade of food.
3. Consumption: This stage refers to the Retail or Food Service enabled food consumption and as the produce/product is awaiting purchase and consumption by consumer, this stage is also crucial to easily explain the product value and quality to the consumers. At this stage the food is graded on
  - a. Shelf life: This aspect is often conveyed to consumer in the usage of word Freshness and signifies the time period in which the product/produce is to be consumed for optimum flavour and/or benefits.
  - b. Origin: In the globally connected value chains, origin of food carries a brand distinction, unto itself, and the same is exceptionally important for import dominated markets such as the GCC region.

Furthermore, consumers are also now being introduced to the grading done at the production stages wherein the Pesticide Free farming, Free-From processing etc. are being sought as a benefit and value add by the consumers.

As explained earlier in the article, the technological interventions in the food value chain have increased unprecedentedly in the past decade and as a result food grading automation has also emerged as a core area of development. This development is in large part dependent on ease of data collection and sharing and at every stage of the food value chain, data on food grading is collected and often neglected.

With the advent of Big Data analytics and automation, Growers, Processors, Retailers and Distributors are now realizing the strategic benefit this data holds and companies globally are able to infer valuable insights on various aspects of food grading. This includes:

- Understanding the data on average quality of produce from a specific geography during a particular season and tallying it up to global demand centres.
- Data on transit temperature shifts is being used to help predict and prepare food shippers define better routes for perishable foods.
- Data on baking techniques and relative shelf life is enabling bakery and confectionary industry to plan and prevent packaging losses.
- Data on Origin and Transit time for perishable foods has enabled better stock planning in the food service sector.
- Data on nutritional value calculated at source enables better consumer confidence as consumers become more and more health aware.
- Quality measurement systems utilizing hand held instruments used at farm and relating data to the retail shelves can predict food perishability at retail outlets thereby reducing wastages.

In conclusion, data economy has well and truly proved its potential in the Agri-Food value chain with Food Grading due for an update beyond the traditional touch and feel test and move towards transparency in the food networks.

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