

Quality  
Assurance  
for the  
Food Industry  
A Practical Approach

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# PREFACE

The concept of quality is often confused with the idea that a product of quality is a luxury item, which in turn implies a costly item. From a practical point of view, however, quality is nothing more than customer satisfaction. At the manufacturing level, quality is defined as an increased level of productivity and safety. It is not possible to talk about quality of a product without considering its safety, and vice versa.

Food companies, regardless of their size and reach (multinational corporations or small local companies), make an effort to attain a high standard of quality/safety in each phase of their operations. In the U.S., a country that maintains one of the world's safest food supplies, this status is maintained, thanks in large part, to a quality/safety monitoring system that watches over food production and distribution at every level — locally, statewide, and nationally. Food inspectors and food scientists working for city and county health departments, state public health agencies, and various federal departments and agencies provide continual monitoring. Local, state, and national laws, guidelines, and other directives dictate their precise duties. They make up the U.S. food quality/safety team.

In Latin America, the potential benefits of trade within the U.S.–Mexico–Canada bloc (also known as the North American Free Trade Agreement [NAFTA]) has spurred businesses and industries, particularly in the agriculture and food manufacturing areas, to search for new ways to improve the quality and safety of products for export. Efforts are being made to promote management and technical expertise, undertaken with the understanding that NAFTA will expand to include all of Latin America. Governments and corporations in these countries understand that the economic survival of their region depends in large part on increased education, which will, in turn, establish a workforce capable of producing desirable export goods. Governments and businesses recognize that quality is a fundamental aspect of achieving the competitive level demanded by the new world market.

This book started out as a collection of notes from the quality assurance classes that I teach at Chapman University; from my experience working at Hunt-Wesson Foods with a large variety of food products, including: tomatoes (ketchup, sauce, paste, stewed tomatoes, and other products), peanut butters, Mexican and Chinese foods, Swiss Miss (chocolate drinks and pudding) products, popcorn products, fat and oil products, and refrigerated products; and later as a consultant for food companies domestically and abroad. Over the past few years, while teaching at Chapman University, at the University of the Americas, or working as a consultant in several countries, I found an increasing number of food producers interested in the implications of total quality management and of quality assurance programs for their operations. This interest seemed similar to what had been occurring to a larger extent in the U.S. through the teachings of Walter A. Shewhart, W. Edwards Deming, Joseph M. Juran, Armand V. Feigenbaum, Philip B. Crosby, and Kaoru Ishikawa and Genichi Taguchi. Reading their works reinforced my desire for writing a book in which I could offer, from my own experience, the practical aspects of both total quality management and of quality assurance.

Many companies understand the concept of quality. They also understand that it is impossible to establish a single division solely devoted to “quality,” as it is a function and responsibility of each and every company employee. These companies have adopted, or are adopting, programs that encompass all the stages of their product’s manufacture. The understanding of this concept and the implementation of programs designed to apply the concept, are defined as “Total Quality Management” or, to use a personal definition, “Integral Quality.” The implementation of an integral quality program demands total employee participation. The results are reduced production defects and manufacturing costs, increased product sales, and the subsequent financial rewards. At the manufacturing level, the tool for this sort of program is known as “Quality Assurance.”

The principles of quality assurance as a function of total quality management and the methodology necessary to establish and implement a quality assurance program for a food manufacturing plant are examined. This requires a concerted effort on the part of the company, with the identification and evaluation of previously unconsidered parameters.

This book provides a comprehensive review of quality assurance, from the concepts and practical applications of total quality management to all aspects of the manufacturing procedures. The text provides students and food professionals with a broad foundation in this area of the food industry.

The book begins with a review of the principles and the methodology necessary to establish a total quality management system. Chapter 1 presents information related to total quality administration, including the

concepts based on the doctrines of “strict” liability and “total accountability,” management and product quality, the working environment, the concept of quality, and the standard for quality used by the food industry. Chapter 2 covers theories, principles, and applications of total quality management, the tools used in its application, and a historical review of its origins, concepts, implementation, and the contributions by the men who were pioneers in the field.

In Chapter 3, the importance of the theories of applications, the functions and need for a quality assurance program and its role in product manufacturing are discussed, stressing the need for employee education and training, process improvement, and interactions between a company’s quality assurance, quality control, product development, marketing, sales, and consumer affairs departments.

Chapter 4 reviews certification programs for raw materials and ingredients, and considers the organization and maintenance of supplier quality programs through quality control, HACCP audits, and identity-preserved ingredient systems. Chapter 5 presents a comprehensive review of statistical concepts as applied to food manufacturing operations and quality control, which are illustrated with practical examples.

In Chapters 6, 7, and 8, the book continues with a description on how to carry out quality audits; analysis and characteristics, purposes, requirements, and the consequences of a lack of quality audits. Specific quality audits are reviewed and examples are presented for better illustration and understanding. Among these, the following are given special attention:

1. Product manufacturing audits. Including programs for in-process operations control, analytical methodology, ingredient qualification and storage, and manufacturing records.
2. Food plant sanitation audits. Including Good Manufacturing Practice regulations; plant sanitation audits (concepts, deviations, and violations; classification and evaluation of deviations and violations); objectives; control and implementation of good sanitary practices.
3. Product quality audits. Including purpose and procedures; data collection and analysis; product quality evaluation.

Finally, Chapter 9 includes a comprehensive study of HACCP and its applications and concepts.

We expect and hope that the contents of this book will be of significant practical assistance to those technical professionals dedicated to the improvement of the constantly growing food industry.

**J. Andrés Vasconcellos, Ph.D.**

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# AUTHOR

J. Andrés Vasconcellos, Ph.D., earned a B.Sc. in chemical engineering from the University of Guayaquil, Ecuador. He continued his food engineering studies (reverse osmosis concentration of fruit juices) at the University of California, Davis, also completing an M.Sc. in food science, working on processing and manufacturing of edible fats and oils and their nutritional implications. Subsequently, he earned an M.Sc. in nutrition and a Ph.D. in agricultural biochemistry and nutrition from the University of Arizona.

Dr. Vasconcellos taught at the University of Guayaquil, Ecuador, at the Technological Institute of Monterrey, Guaymas, Mexico, and at the University of the Americas, Puebla, Mexico. He worked in the food industry as production manager for OLEICA, S. A., the largest fats and oils company in Ecuador, and for Hunt-Wesson Foods, Fullerton, California, in the areas of quality assurance, research and development, and regulatory affairs, over the course of 18 years. At the same time, he accepted a position as adjunct professor at Chapman University, Orange, California, where, after 20 years, he continues to lend his services as an adjunct professor of food science and nutrition and as director of the Short Courses Program.

Dr. Vasconcellos is a distinguished visiting professor with the University of the Americas, Puebla, Mexico and an Emeritus Member of the Institute of Food Technologists and of the American Society for Nutritional Sciences.

After early retirement from Hunt-Wesson Foods, Dr. Vasconcellos established his own company, VascoTech & Sciences, where he acts as its technical and executive director, lending technical support and advice to many companies in the United States and Latin America.

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I have had the intention of writing this book since the time I was working for Hunt-Wesson Foods, where I was exposed to the fascinating experience of quality assurance for the food industry. My background — both academic and practical experience — in chemical and food engineering, food processing, biochemistry, and nutrition allowed me to understand and “visualize” processes, and excel in my work. Equally important was the fact that I was surrounded by and sharing responsibilities with outstanding professionals who helped me and with whom I could work at a high level of excellence, contributing to make Hunt-Wesson’s quality system among the best in the food industry, under the expertise and guidance of Joel Gallin, our boss. Curt Roberts, Rich Fenstermaker, Frank Richards, Gordon Farrimont, Joe Fry, Dave Navarrete, and Dr. T. S. Lin, among others, helped me to fully appreciate the value and importance of quality assurance as a professional field of the food sciences. My experiences with them encouraged me to write this book. I am grateful to my former colleagues, for their friendship and camaraderie in our work.

The demands of a full-time job, plus teaching at Chapman University, did not leave me time for writing. However, at the end of 2000, Dr. Jorge Welti-Chanes, academic vice chancellor of the University of the Americas, Puebla, Mexico, invited me to spend the following year teaching in the Food Engineering Department; I saw my opportunity to write, as well as teach. During the first half of 2001, I was able to complete a good part of the necessary work. Unfortunately, as a result of an accident suffered 4 years earlier, which had been undiagnosed until I was in Mexico, I suffered a series of circumstances that threatened my life, and did not permit me to continue my writing. During that dark period of my life, friends and colleagues at the University of the Americas provided me and my family with the most wonderful support. There is no form of repayment for their actions, except to extend a very special expression of gratitude

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