ASIAN NOODLES
ASIAN NOODLES
SCIENCE, TECHNOLOGY,
AND PROCESSING

Edited by
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In memory of my parents for their unconditional love.
In appreciation of my eldest brother and sister-in-law for their love and unwavering support.
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While it is still being debated whether or not Marco Polo was the first to introduce noodles into Italy in 1296 on his return to Venice from China (Donadio 2009), at least one case about where noodles may have originated has been closed. The Chinese, the Italians, and the Arabs have all claimed that they were the first ones to invent noodles. However, the discovery of a pot of well-preserved 4000-year-old noodles unearthed in 2005 by Chinese archaeologists in the Lajia archaeological site in northwestern China may have finally settled the dispute (Lu et al. 2005). These easily recognizable noodles are more than 2000 years older than the earliest mention of noodles, which appeared in a Chinese book written during the East Han Dynasty sometime between AD 25 and 220. The noodles were thin (∼0.3 cm in diameter), more than 50 cm in length, and yellow in color. They resemble the La-Mian noodle, a traditional Chinese noodle that is made by repeatedly pulling and stretching the dough by hand. It turned out that these 4000-year-old noodles were made from millet, not from wheat flour as they are made today.

Some historical time later, Chinese noodles were introduced into Japan and other Asian countries and beyond, where they were adapted into the local diet and modified, eventually evolving into diverse forms and preparations that have become an essential part of local cuisines. Today, Asian noodles, especially instant ramen noodles, are consumed worldwide. By combining the traditional art of noodle preparation with modern science and processing technology, many noodle products, which used to be produced at small-scale levels, are now being produced in large-scale food manufacturing plants with consistently high quality.

Asian noodles and certain Italian pasta products (e.g., spaghetti) are sometimes confusing to consumers because they appear to be quite similar. This may be one of the causes contributing to the ongoing debate about whether these two products are related or have a common origin. Actually, there are some key differences between them in their characteristics and in the raw materials used, the processes involved, and their consumption patterns (Hou 2001). Most Asian noodles are made from common wheat flour (Triticum aestivum) and a salt solution that are mixed together to form a dough that is processed by sheeting. This type of Asian noodle is often eaten in a soup. In contrast, authentic pastas are traditionally made from durum (Triticum durum) semolina and water mixed together to form a dough that is processed by extrusion technology. This type of pasta is often consumed with sauce.

Outside of Asia, noodles often are made from wheat flour. Within Asia, however, noodles are thought of as thin strips of dough that can be made from a variety of raw materials, including but not limited to wheat flour, rice flour, buckwheat flour, or
starches derived from mung bean, tapioca, sweet potato, sago, wheat, rice, or corn. Noodles made from wheat flour remain the most popular noodle products in Asia and around the world, followed by rice and starch-based noodles, which are consumed primarily in Asia.

The importance of noodles in the Asian diet is significant. Currently, an average of 20–50% of the total wheat flour consumption in many countries occurs in the form of noodles. The percentage of total flour consumed as noodles by country is as follows:

- Indonesia 50%
- Korea 45%
- Vietnam 45%
- Mainland China 40%
- Taiwan 38%
- Malaysia 30%
- Thailand 30%
- Japan 28%
- Philippines 21%

Many of these countries rely heavily on wheat imports because none of them, except for China, grow much wheat. Therefore, the wheat market demand in Asia for noodle flour production is too large to be ignored by the major wheat-exporting countries.

In the last 20 years, there has been a growing global interest in Asian noodles. They are very traditional foods, and early research was mainly conducted in countries such as China, Japan, and Korea; however, information and scientific publications were not easily accessible because they were published in the native languages and not translated for a broader audience. Today, however, a wealth of information and technical publications are available in various scientific journals in English. There are many reasons for this interest, including noodle industry expansion, business development, intercultural exchange, migration, and simple changes in dietary habits. One of the key driving forces behind the scenes was the increased investment and focus of major wheat-exporting countries on developing new wheat varieties to compete in the noodle wheat market in Asia and elsewhere.

Noodle consumption has not only increased dramatically in Asia over the years but has also received wide acceptance in other parts of the world. For instance, the consumption of instant ramen noodles in 2007 reached nearly 100 billion meals around the world (World Instant Noodle Association 2009), an increase of 66% from 2002. Of the top 15 instant noodle-consuming countries, there are five countries in which noodles are not part of the traditional diet: United States, Russia, India, Brazil, Nigeria, and Mexico. Thus, the noodle product is one of a number of wheat-based foods whose globalization continues to stimulate international trade in the world’s top-ranked grains in terms of harvested area (McKee 2009).

For the past 14 years, I have not only witnessed the growth of the noodle industry around the world but have also contributed, to some extent, to its success. When I first joined the Wheat Marketing Center, Inc. in 1995, I was put in charge of conducting the Asian Products Collaborative (APC) project, which was jointly organized by the U.S. Wheat Associates and the Wheat Marketing Center. Throughout the life of this
project (1995–2008), I worked very closely with nearly 380 collaborators in 70 teams from 9 Asian countries. These collaborators included flour millers, food processors, research scientists, and wheat buyers. Together, we developed standard protocols for 13 types of Asian noodles, 6 types of steamed breads, and several other types of products. Each protocol includes formulation, processing, and quality evaluation methods.

After gaining technical expertise through working with these Asian collaborators, I started teaching Asian noodle technology short courses at the Wheat Marketing Center and in institutions overseas to companies in Asia, Africa, Europe, Latin America, and North America. More than 150 noodle processors, flour millers, ingredient suppliers, researchers, and technologists have participated in these courses. In recent years, noodle consumption in Latin America and Africa (particularly Nigeria) has experienced substantial and sustainable growth.

Over the years, I have had the opportunity to travel to many countries and have visited numerous noodle manufacturing plants, both large and small, and was able to provide technical assistance to them. Although much more knowledge and information on Asian noodles is available now than ever before, many people in the industry are still not able to access this, partly because many publications are available only in scientific journals and in a handful of scientific books that contain a few chapters on Asian noodles that were published 10 years ago. This has created an urgent need for a book on the subject. *Asian Noodles: Science, Technology, and Processing* meets this need in a timely manner by providing readers with a comprehensive, up-to-date, single source of information on every aspect of Asian noodles, from wheat breeding to noodle product packaging. There are 16 chapters in all, each written by experts in the subject.

The book begins with noodle-wheat breeding in China since noodles were originated in China thousands of years ago. The wheat-breeding community worldwide will be interested in learning about the strategies that Chinese breeders have employed to develop varieties for their own noodle products. This is followed by breeding for dual-purpose hard white wheat in the United States for noodles and pan bread in Chapter 2. The United States started hard white wheat-breeding programs 20 years ago and hoped to offer alternatives to end-users in Asia for producing both noodles and Western pan bread. This chapter discusses the promising selection strategies in breeding dual-purpose hard white wheat in the United States. Chapters 3 and 4 deal with wheat milling and flour quality analysis for noodles in Japan and Taiwan, respectively. Wheat milling is a critical process in noodle flour production, and the milling industry in both Japan and Taiwan has extensive experience and advanced milling technology. Chapter 5 introduces the commercial noodle processing technology of eight types of noodles consumed worldwide. Chapter 6 discusses the composition, processing, and quality evaluation of instant noodle soup seasonings. Packaging of noodle products is covered in Chapter 7. Chapter 8 reports on laboratory pilot-scale noodle manufacturing and evaluation protocols. Objective and sensory evaluation techniques are introduced in Chapters 9 and 10, respectively. The effects of flour composition and characteristics on noodle quality are examined in Chapters 11 and 13 while the effects of polyphenol oxidase on noodle color and its mechanism are
discussed extensively in Chapter 12. The guidelines for noodle plant setup and resource management are presented in Chapter 14, and quality assurance programs for instant noodle manufacturing are described in Chapter 15. Of course, a volume on Asian noodles would not be complete without a chapter on rice and starch-based noodle products (Chapter 16).

This book contains a good mix of theories on wheat breeding and genes (quality markers) as well as many down-to-earth applied noodle manufacturing technologies, from lab-scale noodle processing and evaluation to commercial noodle manufacturing plant setup and quality assurance programs. This compendium is the first of its kind to provide such comprehensive coverage on Asian noodles in a single English volume with up-to-date scientific and technological information. Many chapters contain excellent photos and diagrams, and each chapter is supplemented by an up-to-date bibliography, allowing for follow-up on the information provided. Therefore, the book should serve as a unique reference for all involved in the industry, including wheat breeders, growers, flour millers, noodle processors, quality control personal, scientists/researchers, students, business developers, and suppliers of food machinery, packaging materials, ingredients, spices, and seasonings, as well as informed consumers and newcomers to the noodle business and related industries.

I am fully aware that despite the extensive topics covered in this book, it cannot be, nor is it intended to be, all-inclusive. By reviewing the latest research and new developments in Asian noodles and compiling all this information into a single volume, we can lay the foundation for continued advancement in breeding, milling, processing, packaging, plant management, and quality assurance programs that will benefit all of us in the not-too-distant future.

GARY G. Hou

REFERENCES


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