Jiaozi (Chinese Dumplings) and Flour Quality Requirements—An Introduction

Jing Lan, Yingying Guo, Xiangdong Sun, Lin Zhao, and Bin Xiao Fu

ABSTRACT

The traditional Chinese dumpling, jiaozi, has a long history and is widely consumed in East and Southeast Asian countries. Jiaozi has become a staple food in China because of the rapidly growing frozen food industry. Wheat flour is the dominant ingredient used in making jiaozi wrappers. High-quality jiaozi wrappers are evenly hydrated, smooth surfaced, white or milky white in appearance, elastic and extensible, with low stickiness. This article briefly describes jiaozi, its processing, and its flour quality requirements.

Introduction to Jiaozi

There is an old saying in China that “Nothing could be more delicious than jiaozi.” Jiaozi typically consist of a filling wrapped in a thinly rolled piece of dough sealed by pressing the edges together. This ancient Chinese food originated during the Eastern Han Dynasty and has a history of more than 2,000 years (1). Jiaozi was called “new moon wonton” during the Three Kingdoms Period (AD 220–280), and “half-moon-shaped wonton” during the Tang Dynasty (AD 618–907). The use of the name “jiaozi” started during the Song Dynasty (AD 960–1279) as it is horn shaped. Because of its resemblance to the shape of golden ingots, eating jiaozi is believed to bring prosperity and luck. In the past, jiaozi was mostly consumed on Chinese New Year’s Eve and during important celebratory family gatherings. Today, jiaozi is eaten year-round because of the rapidly growing frozen food industry. It can be served as an appetizer, side dish, or main course. Jiaozi is usually served with a dipping sauce that may come a staple food in China because of the rapidly growing frozen food industry.

Jiaozi is made with a thin round dough skin in which fillings are wrapped. The filling is sealed inside the wrapping by pressing the edges together, creating crescent or angular shapes. The wrappers for jiaozi can be made with wheat flour dough or a rice or starch dough. The fillings are usually ground meats or can be made with wheat flour are also very popular in East and Southeast Asian countries. Jiaozi is also called “gyozas” in Japan and “mandu” in South Korea. Cooking methods include boiling, steaming, and pan-frying (Fig. 1).

Jiaozi Processing

Commercial production of frozen jiaozi has been growing very rapidly in recent years. The major ingredients for the wrapper are flour, water, and salt. Water absorption for jiaozi wrappers ranges from 40 to 50% (2, 3). Higher water absorption is recommended to facilitate gluten development, but the stickiness of the dough is the limiting factor. The stronger the gluten in the flour, the higher the water absorption (3, 4). The amount of salt added to the flour is usually 1% (5). Salt can strengthen gluten and reduce dough stickiness (6). The basic process for making jiaozi is as follows:

1) Preparation: Flour should be set at room temperature overnight before mixing with water. A salt solution is prepared by dissolving salt in water at around 30°C (5).

2) Dough mixing: Flour is first mixed alone in the mixer for about 5 min, then the salt solution is added to the flour for further mixing (Fig. 2A). Depending on the design of the mixer and the flour strength, the mixing time varies between 10 and 20 min. After mixing, the dough is allowed to rest for about 5 min inside the mixer (Fig. 2B).

3) Sheeting: Dough is sheeted at a gap of ~5.0 mm a few times, with folding after each pass, followed by 10–15 min of rest to relax the gluten network (Fig. 2C and D). The dough is then divided into small dough pieces using a divider (Fig. 2E).

4) Rolling and sealing: Jiaozi wrappers may be formed by hand-rolling (Fig. 2F) to achieve a final thickness of ~1.5 mm. Although machine-made jiaozi accounts for the majority of commercially available products, handmade jiaozi is still very popular and is sold at a premium because of its improved texture and flavor (Fig. 2G).

5) Freezing and packaging: Most commercial jiaozi enter the market in frozen form (Fig. 2H and I).

Flour Quality Requirements for Jiaozi

High-quality jiaozi wrappers are evenly hydrated, smooth surfaced, white or milky white in appearance, elastic and extensible, with low stickiness. Most studies on jiaozi quality in China follow the protocol described in appendix A of LS/T 3203, “The Quality Evaluation of Wheat Flour for Jiaozi Processing” (5). Lan et al. (7) modified the scoring method, using select controls that are given a score of 7 out of 10 for key parameters. Color, degree of swelling, appearance, smoothness, elasticity, stickiness, and flavor are evaluated and scored in comparison to controls.

Since flour is the key ingredient for jiaozi wrappers, selection of wheat significantly impacts the quality of jiaozi. Wheat for jiaozi wrappers should be sound, dry, and clean. The major quality criteria are soundness, kernel hardness, protein content, dough strength, and starch-pasting properties. Execution of proper milling procedures is very critical to ensure the resulting jiaozi flour has a bright color, low ash content, low level of damaged starch, and fine particle size.

The mode and degree of gluten development in jiaozi wrappers are very different from those in bread dough. Protein content is positively correlated with jiaozi firmness and resistance to over cooking (2, 3) but can be negatively correlated with elas-
ticity (2). Therefore, identification of an optimal protein content range is important for maintaining texture characteristics. Jiaozi wrappers are generally made with flours with a protein content range of 10.5 to 11.5%.

Gluten development during mixing is usually incomplete to allow a uniform gluten matrix to be formed during the sheeting and rolling processes. Adequate gluten strength and extensibility is required for making jiaozi (8). Wrappers must be strong enough to withstand sheeting and hold the filling, but not so strong that tearing or breakage occurs. A good level of dough extensibility ensures that wrappers do not shrink back during the rolling process. Flour with a high protein content and strong gluten requires more compression (work input) to achieve the required wrapper thickness. Starch is the predominant component of wheat flour, and its properties can have a significant impact on jiaozi wrapper quality. The pasting properties of starch are important for the texture of cooked jiaozi (9). Wrappers made from partial waxy wheats have soft, smooth, and elastic texture properties after cooking. In terms of color, a bright white or creamy white color is desirable for jiaozi wrappers. Bleaching of flour largely destroys the natural yellow pigments and is not recommended if a creamy color is preferred. Wrappers are less bright with increasing flour extraction rates. Low flour extraction rates and ash levels are preferred for the manufacture of jiaozi wrappers with a clean and bright appearance.

Milling strategies should be properly developed to ensure clean separation of the bran and endosperm, including two-stage tempering and adjustment of break releases in the mill. This might also include a divided flour milling system with patent flour yield as low as 30–40%. Increased protein content of flour also decreases dumpling flour milling lightness (10). A relatively fine flour particle size enables even hydration during mixing and optimal, uniform gluten development during rolling. Excessive starch damage is associated with poor color and undesirably high cooking loss, as well as excessive surface swelling after cooking.

Conclusions

The industrial production of frozen jiaozi is expected to increase further over the next few years because of its convenience and ease of cooking. This requires improvements in processing technology and ingredients to meet the demands of consumers, who expect the frozen jiaozi to have the same cooking quality as the fresh, handmade counterparts. Generally, premium noodle flour with high protein and low ash should be well suited for jiaozi wrappers. For example, flour used for alkaline noodles is also used for gyoza in Japan. Further research is needed on the relationship between flour starch-pasting properties and the cooking quality of jiaozi. Additionally, the application of modified starch for frozen jiaozi processing warrants further exploration.

References