

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

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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 include vinegar, soy sauce, garlic, ginger, and a spicy element.

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 seafood, which are often mixed with chopped vegetables. Products based on rice or starch are usually part of the dim sum family. *Jiaozi* made from wheat flour are also very popular in many Asian countries. *Jiaozi* is also called “*gyoza*” 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* wrap-

pers 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, hand-made *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-

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Fig. 1. Three common types of *jiaozi* (left to right): boiled, steamed, and pan-fried.



Fig. 2. Commercial processing of *jiaozi*. **A**, Salt solution is added to flour; **B**, dough is rested inside the mixer; **C** and **D**, dough is sheeted a few times, followed by resting to relax the gluten network; **E**, dough is divided into small dough pieces using a divider; **F** and **G**, *jiaozi* wrappers are formed by hand-rolling; **H** and **I**, *jiaozi* is frozen and packaged for market.

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 brightness (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.

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