

# Study on the Nutrition and Processing Quality Effects of Oat Food

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**Keywords:** Nutrition, Processing Quality, Effects, Oat Food

**Abstract:** Oatmeal needs to be processed by processing. Before the oats are ground into powder, the seeds are fried, and the oatmeal is cooked with hot water. The oatmeal is eaten by steaming or cooking. This is the “three cooked” processing. In order to study the effects of processing on the nutrition and processing quality of oat traditional foods, the determination of nutrient index, rheological properties, peroxidase activity and whiteness determination, and sensory evaluation were carried out for the pits of different treatment processes. Data analysis showed that the sensory effect of the wolf nest cooked, steamed and cooked was the best. In general, the effect of frying on the whole nutrition and processing quality of the oat nest is the most important part of the “three cooked” process.

## 1. Introduction

Oatmeal is one of the indispensable nutritious foods in people's daily life. Oats belong to the genus *Oataceae*, which can be divided into two types: glutinous oats and bare granules. Oats ranks sixth in the world's eight major food crops, while more than 90% of China's oats are planted with bare-grained oats. Naked oats, also known as buckwheat, have a rich nutritional value, and their nutritional value ranks first among cereal crops, containing 15.6% protein and 8.8% fat. At present, people have more research on the nutritional and health functions of oats. Studies have shown that oatmeal can play a big role in preventing and even treating diseases such as diabetes, cardiovascular and cerebrovascular diseases, hypertension, osteoporosis, and obesity. Oat crops are mainly used for feed, and very few are used for food. In foreign countries, oats are mainly processed into breakfast cereals, bread, biscuits, oatmeal fiber and cakes because the nutritional properties, water retention and oxidation resistance of oats can improve the processing quality of the products and keep the nutrients intact. In China, oats are made into hand-made snacks, such as oatmeal noodles, oatmeal nests and so on. Oat traditional food processing requires the use of processing technology, which is the “three cooked” processing. “Three cooked” foods must be made through the “three cooked” processing process of oatmeal. Before the oats are ground into oatmeal, the seeds are fried, and the oatmeal is cooked with hot water in the dough, and the oatmeal is eaten by steaming or cooking. This is the processing technology. The three-cooking process is indispensable, otherwise it affects the quality of food. Oatmeal nests are typical three-cooked foods. The oat nest is also called Wowotou. It is a method of putting a small piece of oatmeal on the smooth surface of the tile after the oatmeal has been boiled and dried, and then push the oat dough into pieces by hand. , and then rolled into a roll, like a honeycomb to connect a plurality of rolls together, steamed oat rolls on the cage, so called oats nest. In this paper, the oat pits of the “three-cooked” process were tested. The oat pits were treated according to different processing techniques, and the nutritional indexes, rheological properties, calories and catalase activities of the oats were calculated. The test of the effect of the “three-cooked” process on the processing and nutritional quality of oatmeal nests, and the degree of influence of the processing technology, which provides good suggestions for people to make oatmeal food, and is more conducive to oatmeal food. On the Table of every household, it becomes a member of the staple food army.

## 2. Oat Food Development Status

Oats have experienced rapid growth in western developed countries in recent years. Foreign

countries mainly focus on the quality of oats, health functions and separation of active substances. The processing of oatmeal food is second only to wheat, and mature oatmeal such as oatmeal has been established. , oatmeal, etc. Compared with western developed countries, China started late in the application and research of oatmeal food. The main problem is that new products are relatively few, the quality is poor, and the processing technology is backward. The development and utilization of oatmeal food has been stagnant at a low level.

Oatmeal fish, oatmeal, oatmeal, oat bran, etc. are oatmeal products made in China by traditional manual methods; with the maturity of oat milling technology, the new oatmeal products mainly include bread, biscuits, noodles and taro. Etc., but usually mixed with wheat flour before processing the pasta.

Bread made from oatmeal is very nutritious and has a nutty aroma [1]. Currently, oatmeal is added to wheat flour as an excipient at home and abroad to make bread. Qiu Xiangmei] added different proportions of oat flour to wheat flour. By measuring the specific volume and sensory score of the bread, it was found that when the oat flour accounted for 10% of the mixed powder, the sensory score of the bread was the highest; Shana studied the buckwheat dough. Proportion, fermentation, baking and other process parameters, the final appearance of the buckwheat flour is 10% when the appearance of the bread and the intrinsic quality and flavor is better; Wang Shulin and other orthogonal screening test the bare oat bread Good formula, namely, bare oat flour 12%, bread improver 2%, dry yeast 1%, sugar 8%; fermentability in oats according to different strains studied by Kedia [2] and Mårtenssona], Wanjing Jing selected *Lactobacillus plantarum* (LP) and *Lactobacillus san Francisco* (LS) fermented oats to prepare sourdough bread, developed oatmeal sourdough bread; Shen Ruiling and so on by single factor, orthogonal test and sensory evaluation, finally determined to add Oat flour 12%, active dry yeast and improver 1.4%, white sugar 18%, oat bread has good quality and water retention.

Shantou is one of the main foods of people in the wheat-producing areas of northern China and is also very popular in the south. Feng Yanzhen] added a certain amount of oat flour during the processing of traditional steamed bread. By measuring the sensory quality and texture (hardness, chewiness, cohesiveness, etc.) of the steamed bread, it was finally determined that 25% was added to the steamed bread processing. Oat flour and oatmeal have the highest scores; Fumeimei [3] studied the processing technology of six kinds of miscellaneous grains such as oats and buckwheat. Through single factor and orthogonal test, the best formula and process of oatmeal taro were finally added to oat flour. The amount is 20%, the water addition is 51%, the fermentation time is 3h, and the proofing time is 30min. Hu Xinzong studied the processing technology of oat flour bread and steamed bread and added artemisia gum and gluten powder to oat bread and The quality of the steamed bread, the results show that the quality of steamed bread and bread made by adding 2.5% artemisia gum and 8% gluten powder is better.

Biscuits are popular among consumers because of their portability, storage stability and variety of tastes. With the increasingly fierce competition in the biscuit industry, biscuits are developing in the direction of leisure, functionalization and convenience. China also has some research on the production of biscuits from oats. Chen Zhenjia added oat flour, maltitol, etc. to the flour to make oatmeal biscuits. The best formula of oatmeal soda crackers was determined by single factor and orthogonal test: 15% oatmeal, 9% soybean oil, 1.2% salt, pig 5% oil; Xia Xiuhua added oat bran dietary fiber to the dough. By studying the rheological properties of the dough and the sensory evaluation of the biscuit, it was found that when the dietary fiber of oat bran was added 3%, the quality of the oatmeal fermented biscuit was better; [4] et al. studied the effects of different proportions of oat bran on the quality of biscuits and rheological properties of dough. The results showed that when adding 7% of oat bran, the quality of crisp biscuits and tough biscuits was the best; Chen Hongjin The oatmeal biscuits were studied by single factor and orthogonal test. The best formula was 20% oat flour, 6.7% water, 0.02% additive; Liu Hongyuan and so on. Adding white artemisia argyi to make biscuits, cooking can avoid the disadvantages such as bitter taste and color difference, and *Artemisia sphaeroides* can improve the physical properties of buckwheat dough.

Noodle foods are already in a relatively mature stage in China, but compared with Japan and

South Korea, there is still a lot of development potential in terms of market and technology. At present, the above-mentioned strips of food mainly use wheat flour as raw material, and the variety is relatively simple. The proportion of noodles made from miscellaneous grains is small. Although there are some studies on oatmeal noodles, there are few reports, and oats are mainly added to flour in the form of excipients. Wu Xianhui and other experiments determined the best processing technology of buckwheat noodles, the ratio of buckwheat flour to wheat flour 3:7, the amount of water added 40%, the dough processing time 20min; Du Yajun] and other research on the addition of different high-fiber base materials The effect of the amount on the quality of oatmeal noodles, the quality of oatmeal noodles prepared by adding 10% high-fiber base material was determined by the quality of noodles and sensory quality; Zhang Juan developed oatmeal noodles, oat flour, wheat The special noodles and noodle additives were mixed to make noodles. The quality sensory evaluation determined that the appearance and cooking performance of the noodles prepared when adding oat flour 10%-15% were good; Zhu Haixia [5] added certain in the noodle making process. The amount of oat flour was measured by sensory quality and oatmeal texture. The results showed that when the amount of oat flour was 10%, the sensory evaluation and nutritional value of the noodles were greatly improved.

### 3. Biological Characteristics and Nutritional Value of Oats

Oats in daily life refers to plants of the genus *Avina* L. in plant taxonomy. It is an annual herb with a plant height of 80-120 cm and a thousand-grain weight of 25-35 g. It is a cool and humid climate. Suitable temperature 15 -25 ° C. There are 9 species of oats in China, and there are 2 main cultivars, namely, common cultivated oats (*A.Sativa*L.) and naked oats (*A.nuda* L.). Naked oats are also called buckwheat in northern China. China's annual planting of oats is 1 million ha, of which spring naked oats account for more than 90%, mainly distributed in the cold regions of Inner Mongolia, Shanxi and Hebei provinces, accounting for more than 70% of the national oat cultivation area. Due to the limitations of economy, culture, science and technology, variety and ecological conditions, the yield per mu of naked oats in China is very different. The highest yield per mu can reach 400kg, while the average annual yield per mu is 65-75kg.

Nutritional ingredients: Since there are more than 4,000 varieties of oats in China, the content of nutrients varies greatly. This paper lists the results of the determination of nutrient composition of naked oats (multiple varieties) in northern China by some scientific research institutions. The protein content is between 11.35 and 19.94% (calculated by Kjeldahl method, calculated as total nitrogen  $\times$  5.7), and the majority content is about 16%. These proteins contain 18 amino acids, 8 of which are essential amino acids, mostly higher than corn and flour. The fat content was between 3.44 and 9.65 % (determined by Soxhlet extraction) with an average of 6.3 %. The fatty acid composition is mainly composed of palmitic acid, oleic acid, linoleic acid, linolenic acid and eicosenoic acid. The content of linoleic acid is 35.81 -49.75% (referring to the percentage of unsaturated fatty acids), and the average value is 41.42%. It also contains higher levels of corn and wheat: vitamin B 1, vitamin B 2, vitamin E, phosphorus, magnesium, calcium, iron, zinc and cellulose.

Nutritional value: Due to the rich nutrients in oatmeal, the medical community has conducted extensive clinical trials in recent years. The results show that oatmeal processed from oatmeal (the active ingredient is unchanged) is often eaten, for hypertension and cardiovascular disease. Diabetes does have a significant effect. For example, the China Academy of Agricultural Sciences collaborates with 18 hospitals and reports after many years of trials: Hypertensive patients who consume 50 grams of oatmeal every day, cholesterol decreased by 40% after two months, triglycerides decreased by 47.3%, and lipoprotein decreased. 159.7 mg without any side effects. Another example is the cooperation between the Xinjiang Academy of Agricultural Sciences and the Urumqi Friendship Hospital and the Xinjiang Military Region General Hospital. A similar study has been carried out and significant therapeutic effects have been obtained.

#### 4. Processing Technology Changes in Oatmeal Food Nutrition

Although oats are cereals, they contain 80% of unsaturated fatty acids, the main body of which is rich in linoleic acid. Linoleic acid can play a health-care role in anti-inflammatory, anti-cancer, blood fat reduction and immunity enhancement, so oatmeal can also be used as medicine. When the oat kernels are fried, a large amount of oil will separate from the kernel and the fat content will increase. After the frying, the oat kernel has a low residual oil rate and does not block the milling screen. In the high-pressure steaming process, the fat content of oatmeal will drop sharply and be healthier from a food point of view.

Whether it is steamed or cooked, the enzymes in the oat kernel are disposed of. If the microstructure and physical and chemical properties of oats under normal pressure, pressure, frying, baking, etc. are compared, it is found that the content of oat starch under the atmospheric steaming method is the lowest, but the steaming treatment is carried out. The content of oat starch after the increase is increasing. Practice has found that the viscosity of fried and steamed oat flour will fluctuate because the starch granules in the oat flour interact with the starch protein or lipid during processing, which increases the overall adhesion and thus improves Inactivated enzyme efficiency, while increasing the rate of flour extraction.

Oatmeal has a very low dietary fiber of only about 21%, including water-soluble dietary fiber and insoluble dietary fiber. When the oats are crushed, the dietary fiber content of the oats can be increased, including insoluble dietary fiber, cellulose and lignin. Eating such oatmeal is good for human intestinal circulation and prevention of cardiovascular and cerebrovascular diseases, and it can also improve the grinding ability of the human mouth and teeth, and because of the dietary fiber rich and low sugar, it also improves the health of diabetic patients.

The ground oatmeal product is also rich in  $\beta$ -glucan. This oat-specific oat  $\beta$ -glucan can lower the body's cholesterol content, and it is necessary to regulate blood sugar, improve intestinal function and lower blood pressure.

#### 5. Conclusion

In this paper, the changes of nutrient structure and quality characteristics of oats after processing were analyzed. Through the whole process of making oats, the effect of frying process on the quality of oatmeal food was most obvious. It is proved that the processing technology plays a key role in improving the taste quality and nutritional value of oatmeal food.

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