



Brown Rice & Polished Rice

Investigation for Balanced Nutrition and Energy & Grain Conservation





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Twin sister and brother	Wang Ruohan	Wang Ruosen
Project	Recording	Looking up information
	Compilation	Collecting information
	Making questionnaire	Taking photos
	Making tables	Operating experimental facilities
	Weighting rice	Making tables
	Field visit, handing out questionnaires and consulting experts	



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Research Background

We have many television programmes about food health, which talk about greater nutritive value of brown rice than polished rice. Recently, the government practices strict economy and combats waste again. Will wastage be caused by polished rice processing? So, we decide to study brown rice and polished rice.





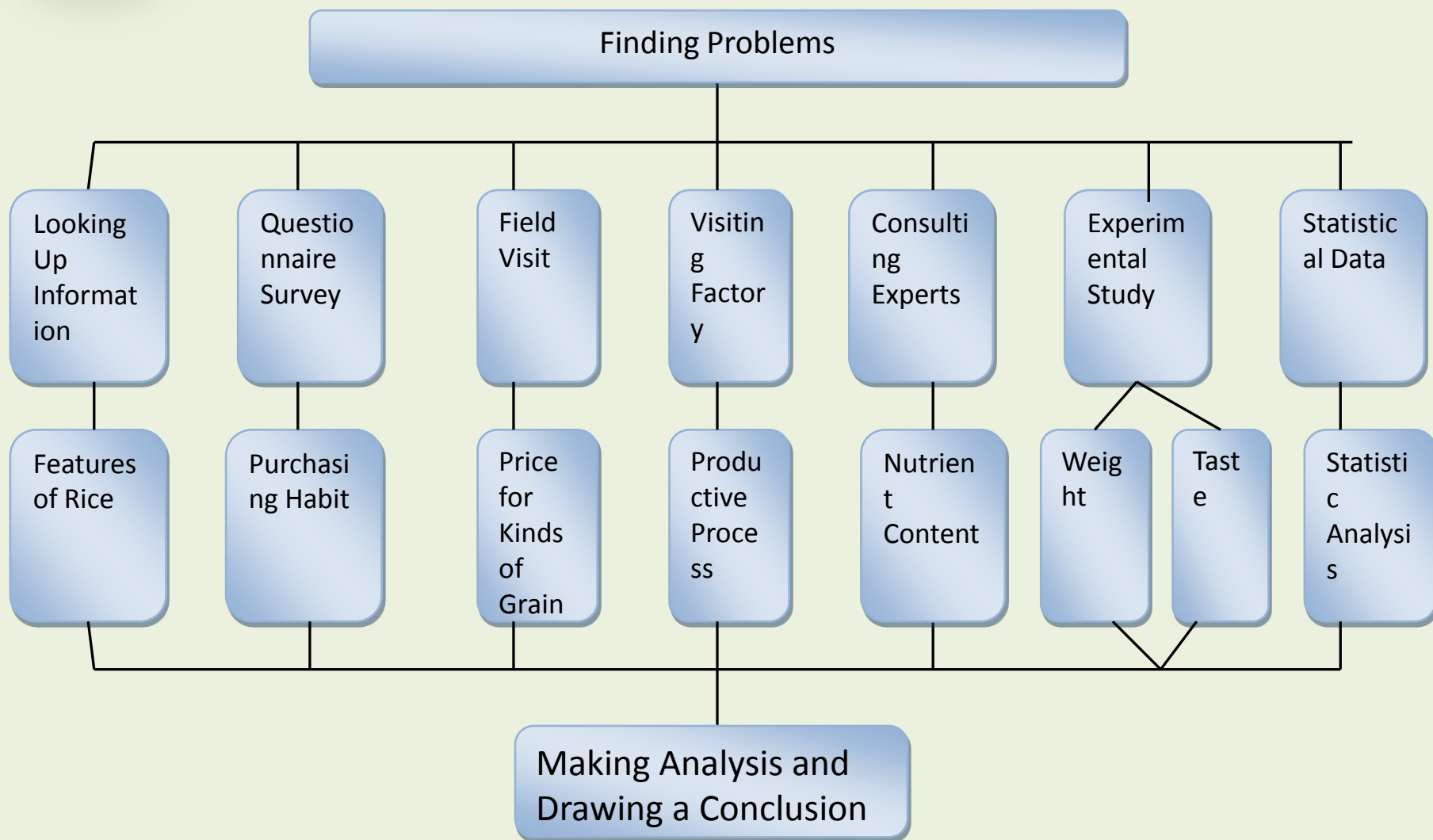
Research Purpose

1. Analyzing consumers' habits to purchase rice by observing and understanding difference and features of brown rice and polished rice.
2. Understanding process flow of brown rice and polished rice.
3. Studying weight of brown rice and polished rice by experiment and paying much attention to grain conservation.





Flow Chart of Research





Research Method

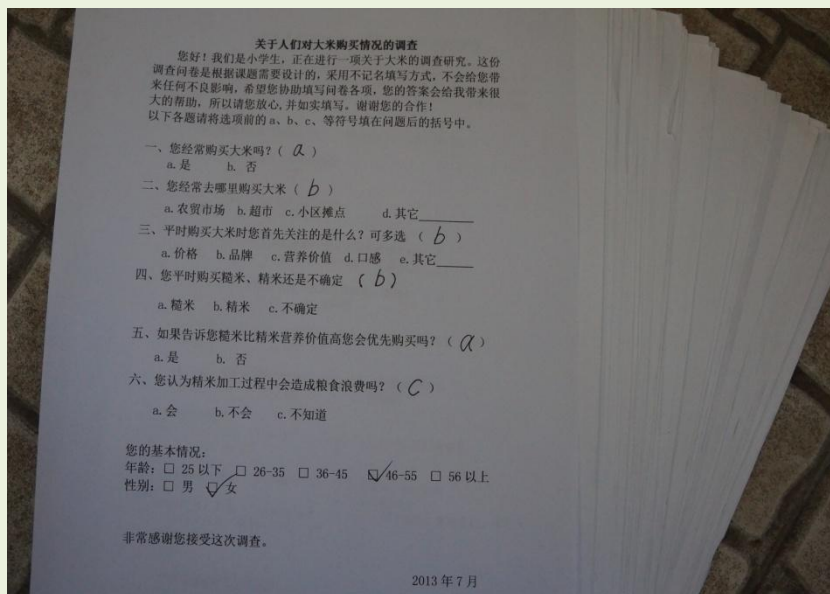
Looking Up Information: we studied information on the internet and purchased relevant books, and primarily understood features of rice after visiting rice field.





Research Method

Questionnaire Survey: we handed out and received 180 effective questionnaires to understand purchasing habits of consumers.





Research Method

Field Visit: we went to six supermarkets and farm produce fairs to understand variety and price of rice for sale.





Research Method

Field Visit: we visited Gu Chuan Rice Enterprise to understand manufacturing technique and work flow in detail.





Research Method

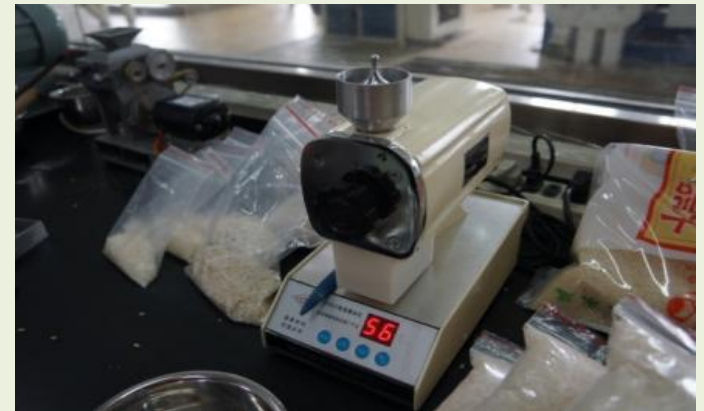
Consulting Experts: comparing and contrasting nutritional ingredients and food wastage of brown rice and polished rice.





Research Method

Experimental study: use small-size rice huller, rice milling machine and other devices to simulate working process of rice, measure wastage and weight brown rice and polished rice produced by grain of same weight.





Research Method

Cooking Experiment: cooking rice with brown rice and polished rice of different proportion and inviting 15 volunteers to taste rice, and finding optimal taste of brown rice.





Research Results

1. Gu Chuan's experimental data indicate that cellulose, microelement and vitamin of polished rice decrease 70%, 50% and 90% respectively.
2. Variety of brown rice accounts for 3.3% of the total in the field.

		Brown Rice	Polished Rice	Loss Ratio	Remnrk
1	Protein	7100	5470	23%	Polished rice contains few protein. To replenish sufficient protein, you have to eat enough polished rice. But, overfeeding may lead to discomfort.
2	Fat	3020	600	80%	It contains grease and would not convert into meat and animal fat.
3	Sugar	70520	5400	92%	Vitamin will be completely saccharified, which will resist desire for sugar.
4	Ash Content	1240	340	73%	Strengthening muscle l
5	Dietary Fiber	1000	300	70%	Facilitating gastrointestinal motility and removing stool.
6	Calcium	21	17	19%	Purifying blood and developing skeleton
7	Phosphorus	332	186	44%	Providing necessary substances of cranial nerve and improving memory
8	Iron	2	1	50%	Preventing anemia, producing erythrocyte and strengthening skeleton and cell
9	Magnesium	75	60	20%	Strengthening skeleton and cell
10	Vitamin B1	500-120	54	55-89%	Insufficient vitamin B1 may lead to dermatomyotitis, dyspepsia, fatigue and slow response.
11	Vitamin B2	66	33	50%	Insufficient vitamin B2 may lead to poor growth, angular cheilitis, aphthous stomatitis and glossitis.
12	Pantothenic Acid	1520	750	51%	Pantothenic acid can develop brain. Dermatitis may be caused due to insufficiency.
13	Folic Acid	20	16	20%	Anemia and leucopenia may be caused to insufficiency. Folic acid is often used to treat tumor.
14	Vitamin B6	620	30	95%	Vitamin B6 is often contained in embryo and yeast and used to treat acidosis.
15	Vitamin K	10000	1000	90%	Insufficient vitamin K may lead to blood coagulation.
16	Vitamin L	Few	No		Insufficient vitamin L may lead to milk shortage.
17	Vitamin E	Few	No		Insufficient vitamin E may lead to infertility and anaemia.
18	Niacin	4100	1000	76%	Insufficient niacin may lead to dermatosis, pneumonia, diarrhea and neuralgia.
19	Biotin	12	8	33%	Insufficient biotin will lead to desolation and hinder walking.
20	Inositol	12400	114	99%	Promoting normal gastrointestinal motility.
21	Calori	340	341	0%	Brown rice and polished rice almost contain equal caloric content.
22	Choline	1E+05	9000	48%	Embryo contains most choline. Insufficient choline may lead to hepatocirrhosis.

Investigation Site Result	Sam's Club	Carrefour	BHG	Chaoshifa	Morning Market	Community
Total Type (Type)	25	61	30	7	9	6
Polished Rice (Type)	25	59	29	7	8	6
Average Price (RMB/500G)	6.51	5.82	4.32	3.99	2.75	2.68
Brown Rice (Type)	0	2	1	0	1	0
Average Price (RMB/500G)	No	3.21	3.88	No	2.55	No



Research Results

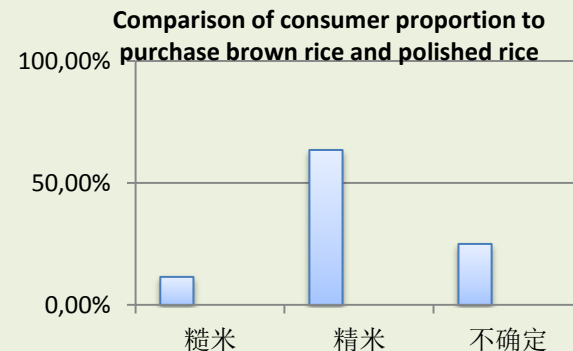
3. 20% weight will be lost if rice in the husk is processed into brown rice. Another 20% weight will be lost to be polished rice.

4. It is reported that only 11% people will purchase brown rice.

5. Rice mixing 1/4 brown rice and 3/4 polished rice will be better than polished rice in taste.

6. Time to chew brown rice is doubled as long as polished rice's.

rice hull	bran powder	rice residue	selection	brown rice	polished rice
18-20%	between 8% and 11%	between 1% and 3%	1%	80%	65-68%



Chewing frequency experiment	5g	8g	11g
brown rice	46 times	65 times	82 times
polished rice	22 times	27 times	32 times

Taste is not very good if fifty-fifty brown rice and polished rice are added. Combination of 1/4 brown rice and 3/4 polished rice will be better. You can taste flavour of brown rice. And, rice would be more chewiness than polished rice. Taking one bite of rice, chewing frequency would be doubled.



Research Results

7. Brown rice is superior to polished rice in nutritive value. And, people fail to fully understand value of brown rice.
8. Excessive rice processing will waste food and energy.
9. Brown rice is not sold widely and has special taste. Unique know-how is necessary to cook brown rice.

	Brown Rice	Polished Rice
Nutrition	Nutrition of rice is totally preserved.	Residual is mostly starch.
Waste	Adding brown rice of 20%, 4.353 tons of rice will be saved.	Annual rice consumption of the school is 10.8834 tons.
Energy Consumption	More than 8.216 KW/h electricity will be saved per year as polishing is reduced once.	1 ton of polished rice needs 21.7KW/h electricity.
Weight	18.5g (1000 grains)	22.35g (1000 grains)
Experiment	Cooking 1/4 brown rice	Cooking 3/4 polished rice



Research Results

10. For example, there is a school with total students of 3,740 and every student takes 150g rice at school every day. Supposing that brown rice of 20% is added at lunch, 4.353 tons of grain will be saved each year. Moderate intake of brown rice not only saves grain but also replenishes various nutrient substances.





Recommendations

- 1. Food sectors and media are suggested to advocate good quality of brown rice and healthy diet. Processing departments shall promote highly processed products of brown rice and attract more consumers.**
- 2. Dietary concept and habit shall be moderately improved to increase intake of brown rice.**
- 3. Food and beverage department, government agencies and school canteen are suggested to increase brown rice, which guarantees both balanced nutrition and conservation of energy consumption and grain.**
- 4. Governmental departments concerned shall make greater efforts to save food and energy consumption, and make more people to realize China's important role as a large country of grain consumption. Food economy shall be started from details.**



Follow-up

- We want to make further study for rice and grain processing. We will advocate scientific diet and call on more manufacturers and consumers to save grain in the name of students. And, we are willing to work together with scientists to find more effective edible methods of brown rice.

Rice Cake

Finely Ground Rice Cake





We hereby acknowledge assistance from our advisor Zhen Yi and other teachers.

