

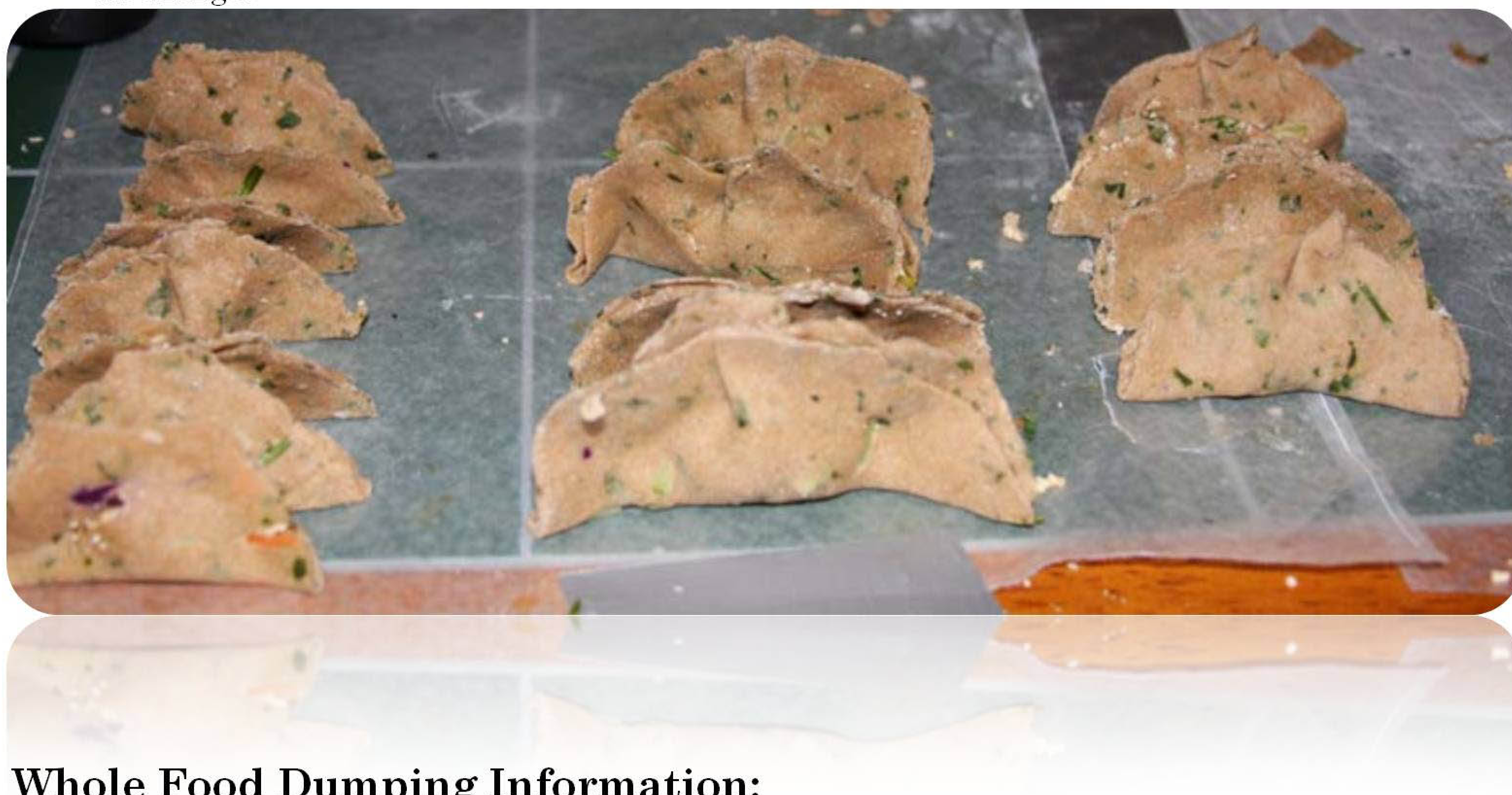
Whole Food Dumpling Production

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Objective:

- Design a manufacturing plant for producing nutrient rich whole food dumplings.
- Design a sustainable plant that will manufacture whole food dumplings with zero discharge.



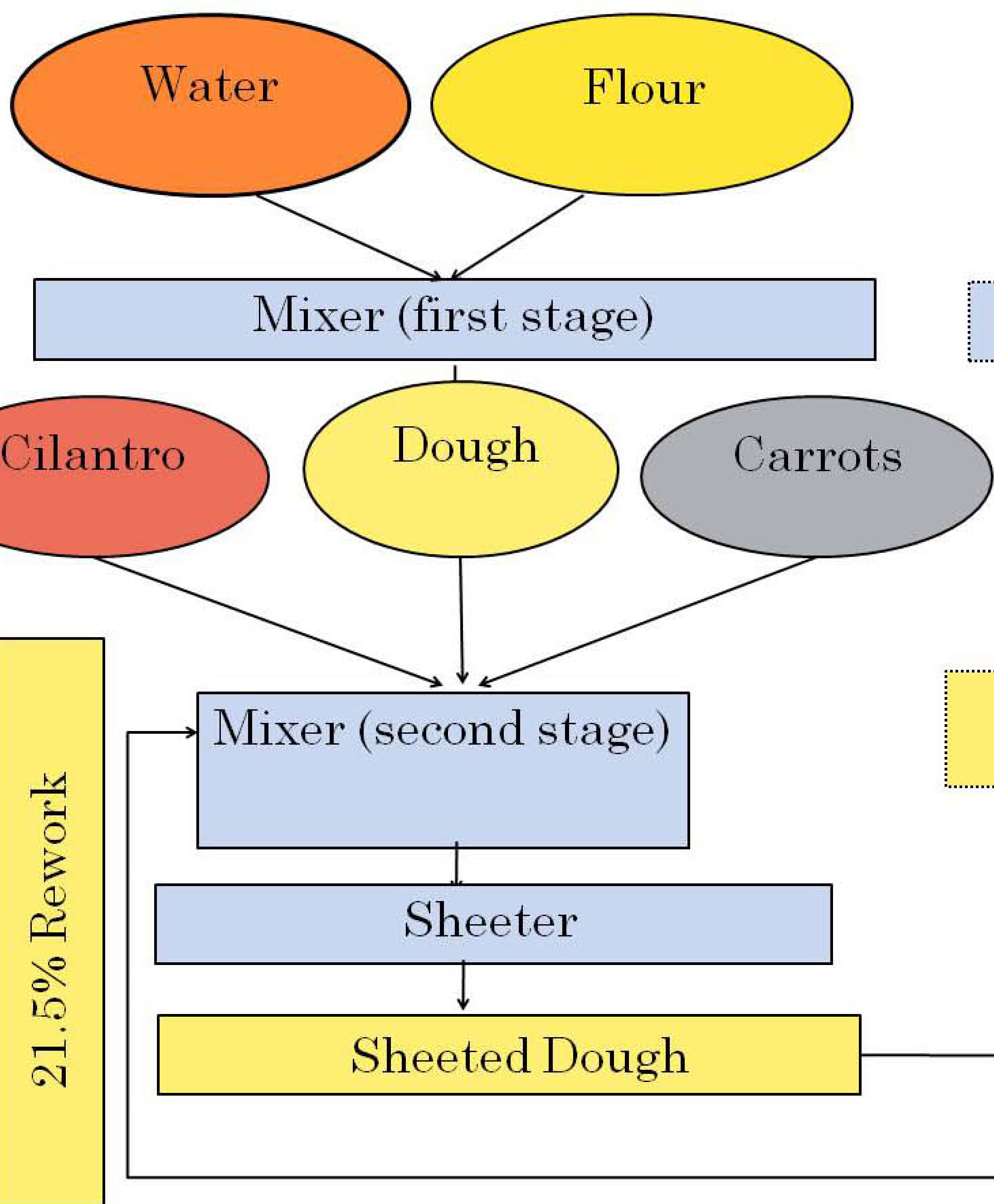
Whole Food Dumping Information:

A whole food dumpling is dumpling that possesses a high amount of nutrients compared to its caloric value. Additionally, it was decided to incorporate a balanced variety of the five basic food groups into the dumpling.

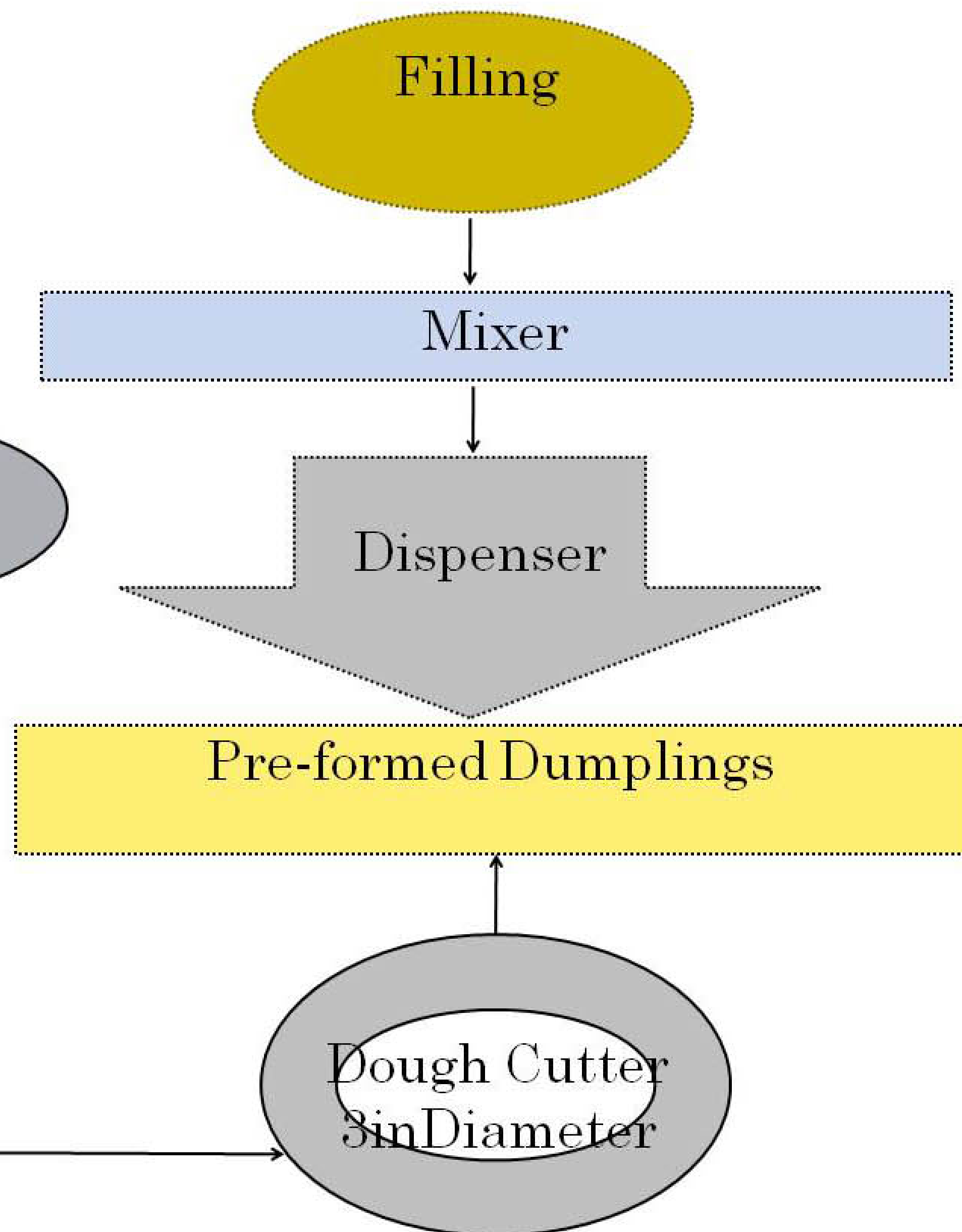
Dough	Filling	Nutrition Facts		Food Group	Dumpling Food Groups	Food Guide
○ Whole Wheat Flour	○ Cabbage	Total Calories	412.8			
○ Cilantro	○ Carrot	Daily Calorie Requirements	2000	Vegetables	5.2	3 to 5
○ Carrots	○ Onion	Total Fat	86%			
○ Water	○ Tofu	Cholesterol	26%	Meat/beans	2.8	2 to 3
	○ Black pepper	Sodium	83%	Cheese	2.8	2 to 3
	○ Hoisin Sauce	Potassium	129%			
	○ Red pepper	Total Carbohydrates	69%			
	○ Tomato	Fiber	168%	Grain	10.4	6 to 11
	○ Soy Sauce	Protein	363%	Fruit	2	2 to 4
	○ Swiss	Vitamin A	187%			
	○ Ginger Root	Vitamin C	391%			
		Calcium	471%			
		Iron	162%			
		Vitamin E	761%			

Dumpling Manufacturing Process

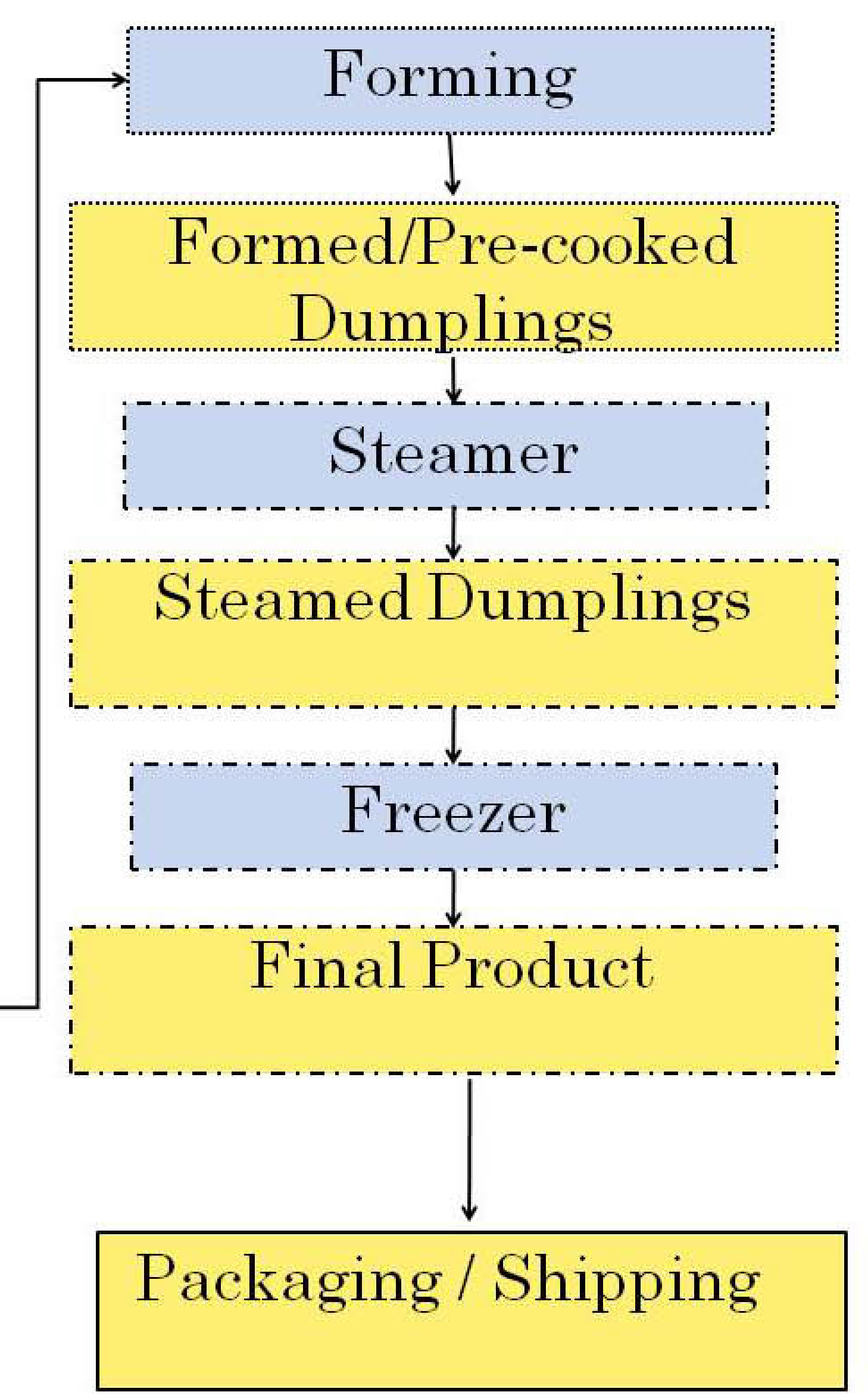
Dough Development



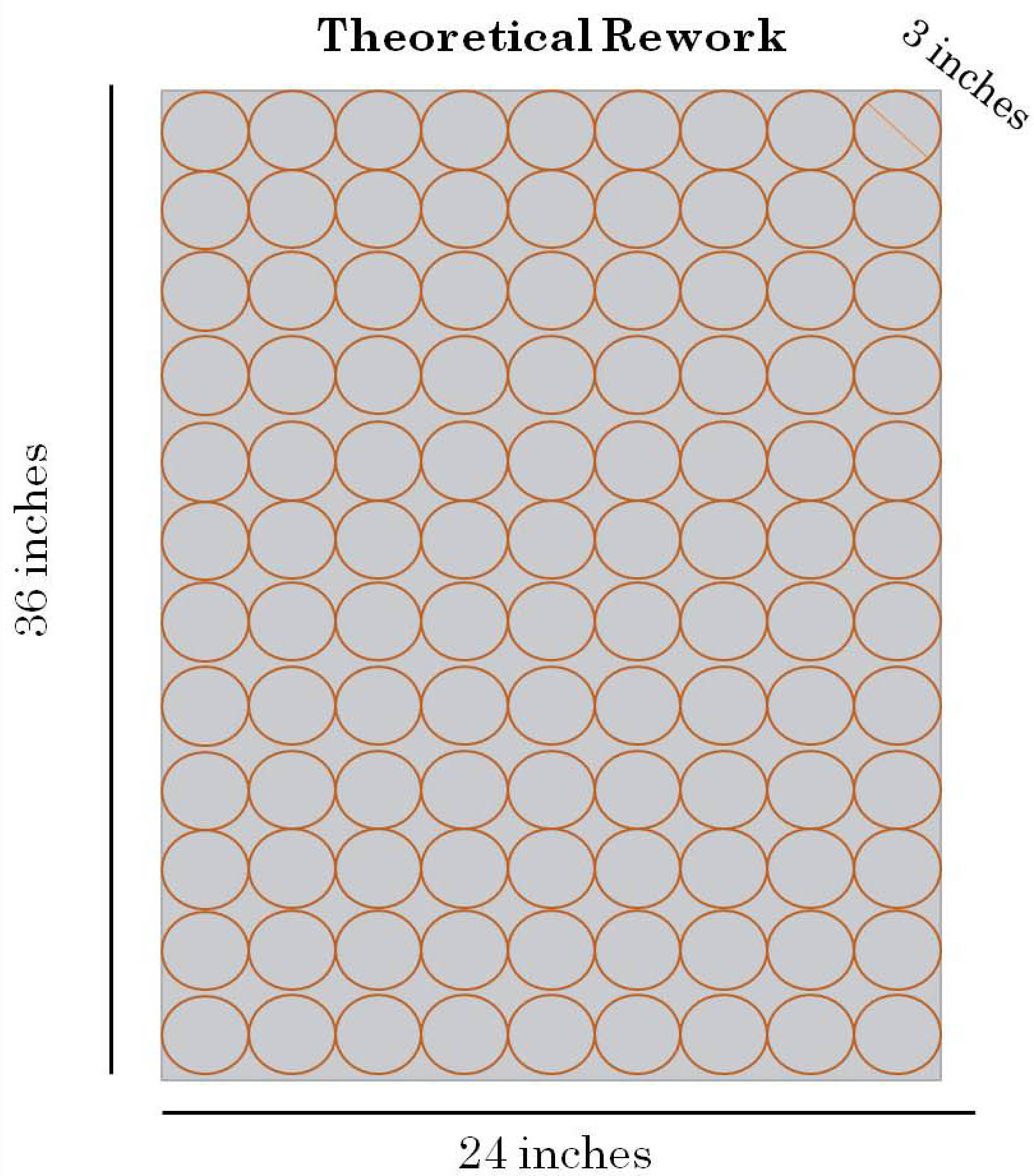
Filling Development



Forming, Cooking, Freezing



Theoretical Rework



Rework

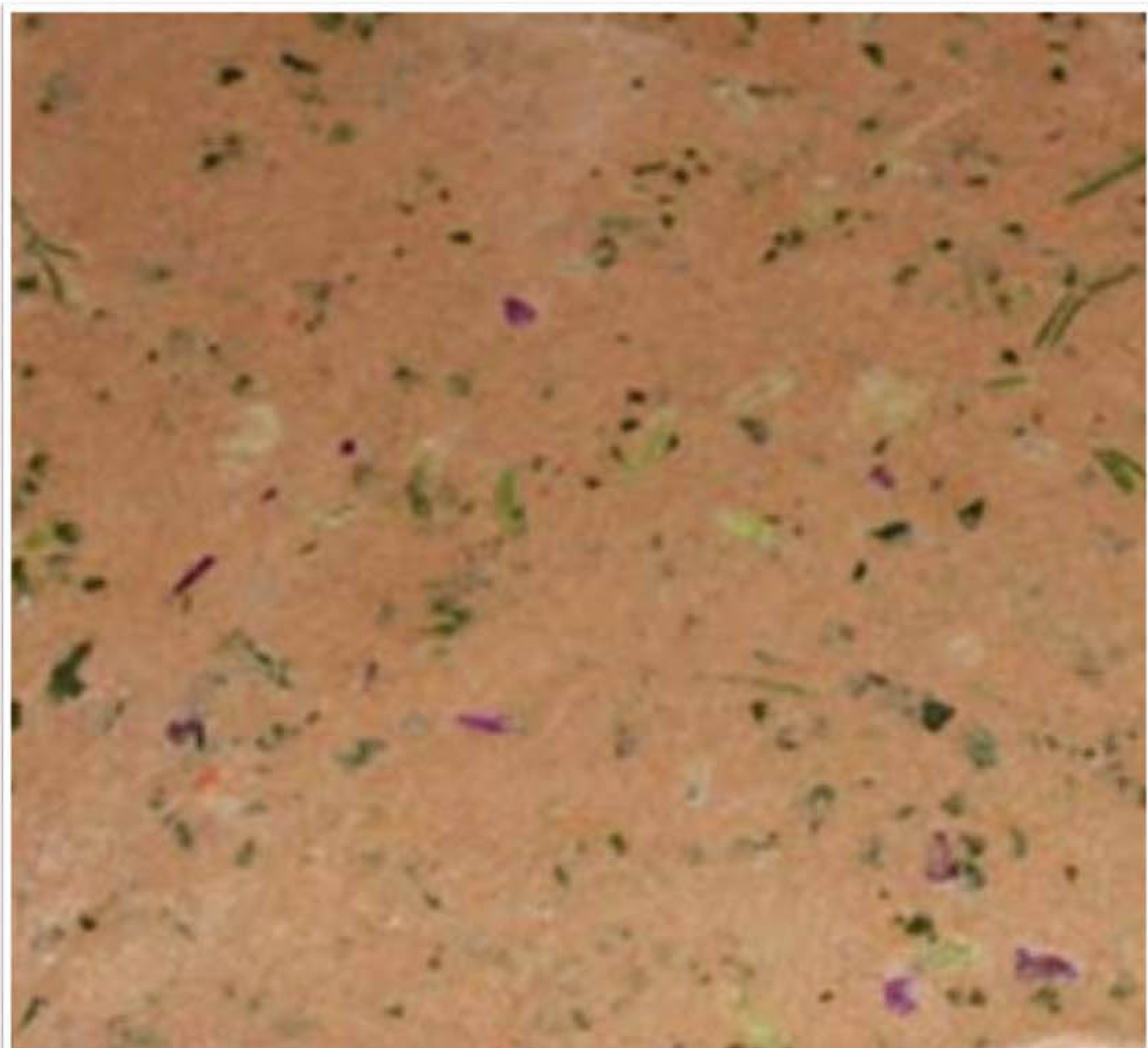
A goal of the manufacturing process is to have zero discharge. However, in the process of creating dumplings of the appropriate size it was found that some dough would go unused. To alleviate this problem, unused dough is transported back to mixer. There the used dough is reworked back into the system.



Economics

A US based dumpling company “Ling Ling” produces roughly 500,000 dumpling per day. The goal of the whole food dumpling manufacturing process is to meet or beat that number. As such, the required ingredients were mapped out with this goal in mind.

Ingredient List	lb / day	Approximate Cost (\$)
Water	8509.37	2.046
Whole Wheat Flour	9930	12410.514
Cabbage	1336.5	24150.555
Minced Onion	458.2	2669.015
Tofu	8600	13200.650
Black pepper	20	119.800
Hoisin Sauce	611	2439.112
Red Pepper	710	4064.750
Tomato	1910	4362.703
Soy Sauce	267.3	3590.374
Low Fat Swiss Cheese	1718.4	5009.136
Ginger Root	230	1534.100
Carrots	2444	15580.500
Cilantro	300	2880.000
Sum	37044.77	92013.255



Dumpling Production

Dough=	0.03 lbs
Filling=	0.035898 lbs
Net Weight=	0.065898 lbs
Dumplings Produced=	51131.14Dumplings

With the given amount of materials, this process can in produce over 500,00 dumplings.

Work in Progress:

- Modified Sheeting / Cutting System: Goal is to use different system to dispense dough and eliminate rework. This will put less strain on the mixer and sheeter.
- Modified Heating / Cooling: Goal is to cut cost by using a cogeneration boiler system to produce heat as well as electricity. Generated electricity will be used to power process.
- Product Testing: Includes modify product recipe to increase palatability as well as testing product self life.