

Study on the Production Technology of Freeze-dried Yogurt with Coffee Peel

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Abstract

Through the study of coffee peel, the organic combination of coffee peel and yogurt can not only solve its waste problem, but also maximize its economic benefits, reduce its environmental pollution, and truly realize the use of coffee peel into magic. The freeze-dried yogurt produced by coffee peel can not only face the domestic market, but also face the international market, which puts forward higher requirements for the design of the production plant. The production process, the annual production situation of the workshop and the raw materials needed in the production process were analyzed, and the material balance, the consumption of water and electricity in the workshop and the production cost were estimated. Completed the factory design of lyophilized yogurt with an annual output of 3000 t coffee peel; The investment of the coffee peel freeze dried yogurt factory is 367,040,867yuan, and the annual profit is 350 million yuan. Therefore, the fund recovery cycle of the factory is short, only one year and one month can recover the cost, has good economic benefits and strong risk resistance ability, for the future industrial production of the product provides a reference.

Keywords

Coffee peel; Freeze-dried yogurt; Plant design.

1. INTRODUCTION

Coffee is the second largest trade food in the world. Yunnan Province is the main coffee producing area in China, with small grain coffee as the main coffee. Yunnan is dominated by mountains, with humid climate, long sunshine duration and high temperature in day and night, which makes Yunnan a land suitable for the growth of *coffea arabica*. At present, *coffea arabica* in Yunnan has been listed as one of the top ten featured agricultural products in Yunnan, and Yunnan is also its largest exporter. In the process of deep processing of coffee, a large number of by-products will be produced, about 45-50% of which will be disposed by landfill or incineration, and only a few will be used as compost, feed, etc., which is both a waste of resources and a serious environmental pollution. A large number of studies have shown that these by-products can be used as a source of value-added products, including a variety of nutritionally active substances (polysaccharides, lipids, proteins, phenols, and cellulose). Due to the mass production and consumption of coffee, these substances can be finely utilized.

Yogurt is a kind of fermented dairy product with rich nutrition, which retains the original nutrients of milk while allowing lactose intolerant patients to eat at ease. Freeze dried yoghurt not only has all the nutritional functions unique to yoghurt, but also has the characteristics of durable storage, convenient transportation and portability.

Therefore, we can use these ingredients of coffee rind to develop a freeze-dried yogurt with coffee rind as raw material, which not only meets the recycling of coffee rind, but also combines the excellent characteristics of freeze-dried yogurt to develop a new product.

2. PRODUCT SCHEME AND MATERIAL BALANCE

2.1. Product scheme

The factory is designed to produce 3000t coffee pericarp freeze-dried yoghurt annually. The designed products are freeze-dried yoghurt made of coffee pericarp, and the packaging forms are bags and cups. Based on the specifications of similar products in the current market, the proposed product specifications are as follows: 25 g for each bag, 30 bags for a box, 40 g for a cup, and 24 cups for a box. The packaging materials are calculated according to 2.5% loss.

This project is planned to use milk and coffee peel as raw materials

The raw materials of the product to be put into production are milk and coffee peel, which must meet the requirements of GB19301-2010 National Food Safety Standard: Raw Milk and DB/033-2022 Local Food Safety Standard: Coffee Peel. According to the need of automation, mechanization and continuous development of production, a production line of 3000t coffee rind freeze-dried yoghurt is formulated.

2.2. Raw and auxiliary materials

Table 1. Raw and auxiliary materials of coffee rind freeze-dried yoghurt

S/N	name	Manufacturer/place of origin	brand	remarks
1	Fresh coffee peel	Pu 'er Tea	Yunnan Coffea arabica	three months
2	Dried coffee peel	Pu 'er Tea	Yunnan Coffea arabica	nine months
3	milk	Kunming Xuelan Milk Co., Ltd	Kunming Xuelan Milk	
4	strain	Kunming Xuelan Milk Co., Ltd	Kunming Xuelan	Lactobacillus bulgaricus, Streptococcus thermophilus
5	White sugar	Shanghai	Shanghai Yishen Health Food Co., Ltd	

2.3. Key points of operation

When purchasing raw materials, we should choose the raw materials with good quality, regular manufacturers and reliable quality; Raw and auxiliary materials, packaging materials and other products must meet the standards before acceptance; Protective agent during drying to prevent browning of coffee peel; According to the process requirements, the coffee peel to be crushed shall be treated, and the appropriate screen shall be selected for screening;

Mix the slurry with a proportion of 16%, and fully mix the mixed slurry to be uniform; According to the proportion of coffee rind, milk and sugar, heat it first, then evenly, then cool it quickly at 85 °C for 20 minutes, and then ferment it; Put the yogurt in a vacuum freeze dryer to dry it. The freezing temperature, vacuum degree and drying time must be the same for the packaged products. Move the packed products from the production workshop to the finished product warehouse for storage, so as to ensure that each product can be found; In addition to preventing rats and flies from damaging the products to varying degrees, the warehouse where products are placed should be kept clean, ventilated, dry and damp [11].

2.4. Balance of raw and auxiliary materials

Table 2. Formula proportion of coffee rind freeze-dried yoghurt

Product name	Coffee pericarp	milk	strain	White sugar
Frozen and dried yoghurt with fresh coffee peel	1.0%	85%	3%	7%
Coffee Dried Fruit Skin Freeze dried Yoghurt	1.5%	85%	3%	7%
Freeze dried yogurt with dried coffee peel powder	0.5%	85%	3%	8%

2.5. Loss of coffee peel

Table 3. Coffee pericarp loss

name Loss rate%	wash	Pulping	filter	Sun	Grinding	Extraction
Fresh coffee peel	0.1%	1%	1%			
Dried coffee peel	0.1%			1%	1%	1%

It can be seen from Table 2-4 that the loss rate of fresh pericarp accounts for 2.1% in the production of coffee pericarp freeze-dried yoghurt; The loss rate of dried coffee pericarp accounted for 3.1%.

2.6. Amount of coffee peel

Table 4. Annual Output of 3000t Coffee Peel Freeze dried Yogurt Coffee Peel Consumption (Unit: t)

name	Shift production quantity	Daily output and consumption	Annual production and consumption	remarks
Fresh coffee peel	0.06	0.12	9.6	three months
Dried coffee peel	0.1	0.2	20	
Coffee dried peel powder	0.04	0.08	5.6	

It can be seen from Table 2-5 that 35.2t of coffee rind is needed for the production of coffee rind freeze-dried yogurt every year.

2.7. Loss of milk

Table 5. Milk loss rate

name Loss rate%	Pretreatment	Preheating	fermentation
Fresh coffee peel	1%	1%	1%
Dried coffee peel	1%	1%	1%
Coffee dried peel powder	0.1%	1%	1%

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