

PREPARATION OF QUINOA ADDED BISCUITS

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Abstract:

Quinoa is a nutrient-rich pseudo-cereal, providing essential nutrients such as protein, fiber, vitamins, and minerals. Adding quinoa to biscuits can enhance their nutritional profile, making them a healthier snack compared to traditional biscuits made solely with fine flour. Quinoa has been a staple food in the Andean region of South America for thousands of years, particularly in countries like Peru, Bolivia, and Ecuador. Its cultural significance extends beyond its nutritional value, playing a vital role in traditional ceremonies. Quinoa contains all nine essential amino acids, making it a complete protein source. By incorporating quinoa into biscuits, you can increase the protein content of the final product, which can be beneficial for individuals looking Consuming quinoa has been associated with various health benefits, including improved digestion, reduced risk of certain chronic diseases, and better weight management. By including quinoa in biscuits, you can offer a snack or treat option that not only tastes good but also supports overall health and well-being. to boost their protein intake, especially those following vegetarian or vegan diets.

While making quinoa biscuits three methods are adopted. The first method the percentage of quinoa was 70 and the percentage of wheat flour was 30 and the second method of making biscuits the percentage of wheat flour was 70 and percentage of quinoa was 30. The 3rd method of making quinoa biscuits the percentage of quinoa was 90%. After these three methods we identify different results

Some experiments are performed in lab like moisture and ash analysis. The percentage of moisture analysis is 5.88 and the percentage of ash analysis is 5.17. Study shows different results from three methods the biscuits which have 70% quinoa are healthier but the taste of biscuits is little bit bitter due to high content of quinoa and low content of sugar. In second method which we use 30% quinoa are sweet and good taste and their nutritional profile is also good. In 3rd method which we use 90% quinoa for making biscuits are very sour and their taste is not good so we identify the 30% of quinoa biscuits are much better from these 2 methods.

Introduction

History of Wheat:

Wheat is the staple food of this region. In Pakistan during 1960 wheat production was 3.91 million tons whereas area under wheat production was 4.88 million hectares. But after five decades the wheat production is about 23.86 million tons whereas corresponding area is about

9.041 million hectares. The growth is very much related with the inception of green revolution during 2nd and 3rd Five Year Plan (1960-70). Technology, new breed of seeds, fertilizers, expansion in irrigation and other agricultural policies have played their positive role. Pakistan is expecting a record-breaking wheat production in the 2024-25 marketing

year, with forecasts predicting an output of 28.8 million tons. This represents a 2% increase from the previous year's harvest of 28.2 million tones' and a 9.1% increase from the 26.2 million tone's harvested in 2022. The primary wheat-producing regions are Punjab, which accounts for about 74% of the total wheat area, and Sindh, which contributes around 13%'. The government has set wheat intervention prices at 3900 Pakistan Rupees per 40 kg in Punjab and 4000 Rupees per 40 kg in Sindh.

Diseases:

Consuming wheat can cause several health issues, especially in individuals with specific sensitivities or conditions. Here are some common problems associated with wheat consumption that are celiac disease, non-celiac gluten sensitivity, wheat allergy, Irritable bowel syndrome, Diabetes and weight gain problems.

Celiac disease is a chronic autoimmune disorder that primarily affects the small intestine. It starts with the ingestion of gluten, a protein found in wheat. When people with celiac disease eat gluten, their immune system reacts by damaging the lining of the small intestine. This damage impairs nutrient absorption and can lead to a variety of health problems. In people with celiac disease, the ingestion of gluten leads to an immune-mediated inflammatory response in the small intestine. Specifically, the immune system mistakenly targets and attacks the villi, the tiny, finger-like projections lining the small intestine. These villi are crucial for nutrient absorption. When they are damaged or destroyed, the body's ability to absorb essential nutrients, vitamins, and minerals is compromised.

A wheat allergy is an allergic reaction to food containing wheat. Allergic reactions can occur from eating wheat and in some cases from breathing in wheat flour. Avoiding wheat is the primary treatment for wheat allergy, but it's not always as easy as it sounds. Wheat is found in many foods, including some you might not suspect, such as soy sauce, ice cream, and hot dogs. If you accidentally eat wheat, medication may be necessary to manage an allergic reaction. Wheat allergy is sometimes confused with celiac disease, but these conditions are different. A wheat allergy occurs when your body makes antibodies to proteins found in wheat. In celiac disease, a specific protein in wheat gluten causes a different kind of abnormal immune system reaction. If your parents have food allergies or other allergies, such as asthma, win infants and young children, whose immune and digestive systems are immature. Most children develop a wheat allergy by age 16, but adults can develop it as a cross-sensitivity to grass pollen.

Irritable bowel syndrome (IBS) is a chronic gastrointestinal disorder characterized by symptoms such as abdominal pain, bloating, gas, diarrhea, and constipation. Many people with IBS report that certain foods can trigger or worsen their symptoms. Wheat is a common trigger due to its content of gluten and FODMAPs (fermentable oligo-, di-, mono-saccharides, and polyols), which can be problematic for some people with IBS. Some individuals with IBS may have non-celiac gluten sensitivity (NCGS), where gluten can cause symptoms similar to those of IBS even in the absence of celiac disease. For those with non-celiac gluten sensitivity or who suspect gluten triggers their IBS symptoms, a gluten-free diet may be helpful. This diet excludes all sources of gluten, which is found in wheat.

Wheat and other carbohydrate-rich foods can impact blood sugar levels and weight, which is particularly important for individuals with diabetes. Managing these aspects involves understanding how wheat affects the body and making informed dietary choices. Wheat products, particularly refined ones like white bread and pastries, have a high glycemic index (GI), which means they can cause rapid spikes in blood sugar levels. Whole wheat products have a lower GI compared to refined wheat products, leading to a slower release of glucose into the bloodstream. Carbohydrates in wheat are broken down into glucose, which raises

blood sugar levels. Managing portion sizes and choosing whole grains can help control blood sugar. Wheat products, especially refined ones, can be calorie-dense and less satiating, leading to overeating and weight gain.

To avoid wheat allergy or other wheat diseases people use different food products or add other healthy ingredients or use fortified food to reduce the risk of diseases caused by wheat. People add rice flour, maize flour, chickpea flour etc. These flours are added to wheat flour to reduce the risk of wheat diseases.

Quinoa:

Quinoa, pronounced "keen-wah," has a rich history dating back thousands of years, originating from the Andean region of South America, particularly Bolivia, Peru, and Ecuador. Revered by ancient civilizations like the Incas, quinoa was considered a sacred crop, often referred to as the "mother of all grains" due to its exceptional nutritional value and versatility. It played a vital role in the diet and culture of these civilizations, sustaining populations in harsh environments such as the high altitudes of the Andes mountains. Despite its long history, quinoa remained relatively obscure outside of South America until recent decades. In the late 20th century, the Western world began to recognize its nutritional benefits, including its high protein content, essential amino acids, fiber, and various vitamins and minerals. This newfound appreciation led to a surge in quinoa's popularity globally, positioning it as a staple in vegetarian, vegan, and gluten-free diets. Today, quinoa is cultivated in diverse regions worldwide, contributing not only to nutrition but also to agricultural sustainability and economic development in many communities. Its journey from ancient grain to modern superfood underscores its resilience and enduring significance in the quest for healthier diets and sustainable food systems.

In bakery products, quinoa adds a nutritious twist to traditional recipes, enhancing both flavor and health benefits. Quinoa flour, derived from finely ground quinoa seeds, is a key ingredient in gluten-free baking. It imbues baked goods like bread, muffins, cookies, and cakes with a unique nutty taste and a delicate texture while providing a protein-packed punch. Quinoa flakes, a rolled form of quinoa grains, are often used in granola bars, cookies, and breakfast pastries, adding a wholesome crunch and a boost of protein and fiber. Moreover, quinoa can be incorporated into artisan bread recipes, adding depth of flavor and nutritional value to loaves and rolls. Whether as flour, flakes, or whole seeds, quinoa enriches bakery products with its versatility, making them not only delicious but also nourishing options for health-conscious consumers seeking gluten-free alternatives.

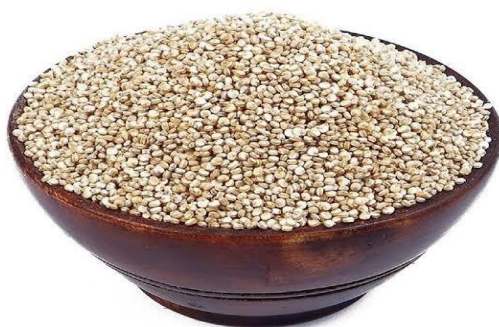


Figure 1.1 Quinoa Seeds

It has many health benefits and is an easy way to add variety to your diet. Quinoa is a better source of antioxidants than other common grains in a gluten-free diet. Most gluten-free

products contain corn, rice, or potato flour. These typically provide fewer nutrients than products using quinoa, such as quinoa flour. Quinoa doesn't take long to prepare, and you can add it to your diet in both sweet and savory dishes. Its gluten-free nature has also contributed to its popularity among individuals with gluten sensitivities or celiac disease. With a slightly nutty flavor and a light, fluffy texture when cooked, quinoa serves as a versatile ingredient in various culinary applications, ranging from salads and soups to pilafs and breakfast bowls. Its adaptability, nutritional benefits, and pleasant taste have made quinoa a staple in healthy diets worldwide.



Figure 1.2 Quinoa Flour

Quinoa has gained popularity as a health food in the United States and other Western countries, although people have been cultivating it since ancient times in South America. Over the past two decades, quinoa has grown in popularity rapidly as demand for an easy-to-grow, nutritious, gluten-free grain alternative has grown. Quinoa is not only nutritious, but it can also offer health benefits.

Here's a table of the nutritional value of quinoa per 100 grams:

Table 1.2 Nutritional Profile of Quinoa

Nutrient	Amount per 100g
Calories	120
Total Fat	1.9g
Saturated Fat	0.2g
Monounsaturated Fat	0.5g
Polyunsaturated Fat	1.1g
Cholesterol	0mg

Sodium	4mg
Potassium	172mg
Total Carbohydrates	21g
Dietary Fiber	2.8g
Sugars	0.9g
Protein	4.4g

Quinoa is also a good source of various vitamins and minerals, including Vitamin B1, B2, B3, B6, Folate, Vitamin E, Calcium, Iron, Magnesium, Phosphorus, and Zinc. Quinoa offers a multifaceted approach to reducing the risk of disease, thanks to its impressive nutritional profile and health-promoting properties. Rich in essential nutrients such as protein, fiber, vitamins, and minerals, quinoa serves as a powerhouse grain that supports overall well-being. Its abundance of antioxidants, including flavonoids and quercetin, help combat oxidative stress and inflammation, thus lowering the risk of chronic diseases like heart disease, cancer, and neurodegenerative disorders. Moreover, quinoa's heart-healthy attributes stem from its fiber content, which aids in reducing cholesterol levels, while its protein and potassium help regulate blood pressure, mitigating the risk of cardiovascular ailments. By offering a low glycemic index and promoting stable blood sugar levels, quinoa proves advantageous for individuals managing diabetes or at risk of developing it. Its fiber content further bolsters digestive health, reducing the likelihood of gastrointestinal issues like constipation and diverticulosis. Additionally, as a satiating and nutrient- dense food, quinoa aids in weight management efforts, thus decreasing the risk of obesity-related diseases. Lastly, its gluten-free nature provides a safe alternative for those with celiac disease or gluten sensitivity, allowing them to maintain a healthy diet without compromising their health. Overall, incorporating quinoa into one's dietary regimen can significantly contribute to disease prevention and overall wellness.

Figure 1.3 Health Benefits Of Quinoa

The combination of quinoa with wheat flour holds promise for improving the nutritional content, functional properties, and sensory attributes of baked goods. This fusion not only addresses dietary requirements but also aligns with the growing demand for healthier food choices. Nonetheless, further research is warranted to delve deeper into aspects such as



product optimization, consumer perception, and long-term health implications. potential health benefits associated with consuming quinoa-wheat products. These benefits include a reduced risk of chronic diseases such as heart disease, diabetes, and obesity. By fortifying wheat-based goods with quinoa, manufacturers can create products that not only cater to nutritional needs but also align with consumer preferences for healthier options. Consumer acceptance, however, remains a crucial aspect, with studies exploring factors like taste, texture, appearance, and cultural inclinations to optimize product appeal.

Beyond nutritional enhancement, this blend introduces a nuanced interplay of texture and flavor. Quinoa's distinctive nutty taste and slightly crunchy texture complement the traditional characteristics of wheat-based items, offering a novel sensory experience. Additionally, quinoa contributes functional properties to the amalgamated flour mix. Compounds like saponins, polyphenols, and antioxidants found in quinoa may enhance dough rheology, water absorption, and shelf life, thereby bolstering the overall quality and longevity of baked products. the combination of quinoa with wheat flour have revealed promising outcomes across various dimensions. Firstly, this amalgamation enhances the nutritional profile of wheat-based products significantly. Quinoa, celebrated as a superfood, is abundant in protein, fiber, vitamins, and minerals.

Incorporating it into wheat flour enriches the final product with these essential nutrients, thus augmenting its overall health benefits. Moreover, the fusion can potentially mitigate gluten-related issues inherent in wheat flour. As quinoa is naturally gluten-free, its addition reduces the gluten content of baked goods, rendering them more tolerable for individuals with gluten sensitivities or celiac disease. Adding quinoa to biscuit recipes can offer nutritional benefits, enhance flavor and texture, and potentially expand the market for gluten-free or health-oriented snack options. However, it's essential for manufacturers to carefully consider formulation adjustments and consumer preferences to create successful quinoa-enriched biscuit products.



Figure 1.4 Quinoa \$ Wheat Flour

In terms of flavor and texture, quinoa and wheat flour offer distinct experiences. Quinoa has a nutty flavor and a slightly crunchy texture, adding depth and complexity to dishes. Wheat flour, on the other hand, has a milder taste and a soft, smooth texture when baked into goods. Overall, while both quinoa and wheat flour have their unique qualities and culinary applications, they cater to different dietary preferences and nutritional needs. Quinoa shines as a gluten-free, nutrient-rich option, while wheat flour excels in providing structure and texture to baked goods. Understanding these differences allows chefs and home cooks to

leverage the strengths of each ingredient in their culinary creations. The combination of wheat flour and quinoa offers versatility in baking. You can experiment with different ratios of the two ingredients to achieve various textures and flavors in your baked goods. From bread and cookies to pancakes and muffins, the possibilities are endless. Quinoa has excellent moisture retention properties. Adding it to wheat flour dough can help keep the baked goods moist and tender for longer periods, extending their shelf life without the need for added preservatives.

Overall, the combination of quinoa and wheat flour in cookie recipes can lead to cookies with an extended shelf life compared to traditional recipes. However, it's essential to consider other factors such as storage conditions (such as temperature and humidity) and the presence of other ingredients (such as fats and sugars) that can also influence shelf life. Properly stored in an airtight container at room temperature, cookies made with quinoa and wheat flour can maintain their quality for several days to a week, providing a delicious and nutritious treat for longer enjoyment.

Material and Methods

Experiment of Wheat Flour Biscuits in dry oven:

Ingredients for the wheat flour biscuit

Table 1.3Ingredients for the
wheat flour biscuit

Ingredients	Amount
Wheat flour	100 g
Oil, butter, Desi ghee	40 g
Egg	1
Sugar	20 g
Salt	2 g
Water	55 ml
Baking powder	0.35g

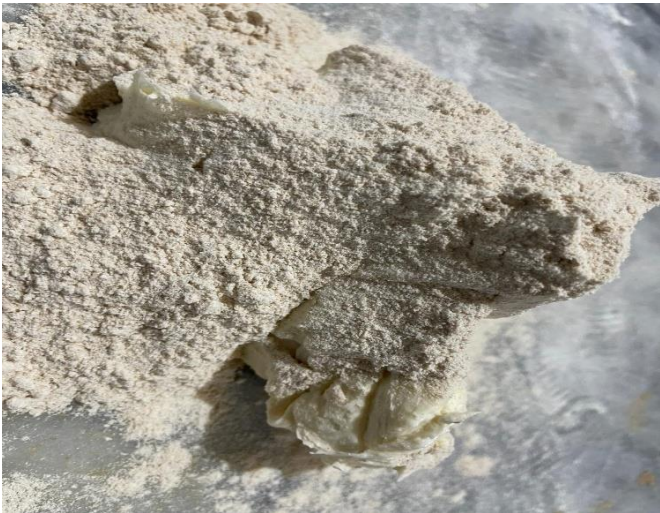


Figure 1.5 Wheat Flour Dough

Procedure:

Making whole wheat flour biscuits is quite similar to making regular biscuits, with the key difference being the substitution of whole wheat flour for all-purpose flour. Weigh all ingredients. In a large mixing bowl, whisk together the whole wheat flour, baking powder, and salt and other ingredients until well combined. Subsequently, the leavened dough was left for 20 minutes at 37° C. Use a biscuit cutter or the edge of a glass to cut biscuits from the dough. Press straight down without twisting to ensure the biscuits rise properly. It becomes soft and creamy type solid solution. Then take some quantity of dough on the dye and put in the dry Oven with the temperature of 180° C temperature for 20 minutes. After the biscuit prepared and analyzed from the different peoples.



Figure 1.6 Wheat Flour Dough During Mixing

Experiment of Quinoa Flour Biscuits in dry oven:

Ingredients for the quinoa flour biscuit

Table 1.4 Ingredients for the quinoa flour biscuit

Ingredients	Amount
Quinoa flour	100 g
Sugar	30 g
Egg	1

Desi ghee, cream, oil	40 g
Water	55 ml
Salt	1g
Baking powder	0.35g



**Figure 1.7 Quinoa Flour
Dough**

Procedure:

Making quinoa flour biscuits is quite similar to making regular biscuits, with the key difference being the substitution of quinoa flour for all-purpose flour. Weight all ingredients. In a large mixing bowl, whisk together the quinoa flour, baking powder, and salt and other ingredients until well combined. Subsequently, the leavened dough was left for 20 minutes at 37° C. Use a biscuit cutter or the edge of a glass to cut biscuits from the dough. Press straight down without twisting to ensure the biscuits rise properly. It becomes soft and creamy type solid solution. Then take some quantity of dough on the dye and put in the dry Oven with the temperature of 180° C temperature for 20 minutes. After the biscuit prepared and analyzed from the different peoples.

Figure 1.8 Dough after pressing

Experiment of Half Wheat flour & Half Quinoa Flour Biscuits in dry oven:



Ingredients for the wheat flour & quinoa flour biscuits:

Table 1.5Ingredients for the wheat flour & quinoa flour biscuits

Ingredients	Amount
Wheat flour	100 g
Quinoa flour	100 g
Sugar	60 g
Egg	1
Desi ghee, cream, oil	60 g
Water	65 ml
Baking powder	0.35g



Figure 1.9 wheat flour & quinoa
flour Dough

Procedure:

Making whole wheat flour and quinoa flour biscuits is quite similar to making regular biscuits, with the key difference being the substitution of whole wheat flour and quinoa flour for all-purpose flour. Weight all ingredients. In a large mixing bowl, whisk together the whole wheat flour, quinoa flour, baking powder, and salt and other ingredients until well combined. Subsequently, the leavened dough was left for 20 minutes at 37° C. Use a biscuit cutter or the edge of a glass to cut biscuits from the dough. Press straight down without twisting to ensure the biscuits rise properly. It becomes soft and creamy type solid solution. Then take some quantity of dough on the dye and put in the dry Oven with the temperature of 180° C temperature for 20 minutes. After the biscuit prepared and analyzed from the different peoples.



Figure 1.10 Dough during
mixing

**Experiment of 70% Wheat flour & 30% Quinoa flour Biscuits in dry oven: Ingredients
for the wheat flour & quinoa flour biscuits:**

Table 1.6 Ingredients for the wheat
flour & quinoa flour biscuits

Ingredients	Amount
Wheat flour	70 g
Quinoa flour	30 g
Sugar	30 g
Egg	1
Desi ghee, cream, oil	40 g
Water	50 ml
Baking powder	0.35g



Figure 1.11 wheat flour &
quinoa flour dough

Procedure:

Making 70% wheat flour and 30% quinoa flour biscuits is quite similar to making regular biscuits, with the key difference being the substitution of 70% wheat flour and 30% quinoa flour for all-purpose flour. Weight all ingredients. In a large mixing bowl, whisk together the wheat flour, quinoa flour, baking powder, and salt and other ingredients until well combined. Subsequently, the leavened dough was left for 20 minutes at 37° C. Use a biscuit cutter or the rim of a glass to cut out biscuits from the dough. Press straight down without twisting to ensure the biscuits rise properly. It becomes soft and creamy type solid solution. Then take some quantity of dough on the dye and put in the dry Oven with the temperature of 180° C temperature for 20 minutes. After the biscuit prepared and analyzed from the different peoples.



Figure 1.12 Biscuits after molding

Experiment of Wheat Flour Biscuits with peanuts in dry oven: Ingredients for the wheat flour biscuit:

Table 1.7 Ingredients for the wheat flour biscuit

Ingredients	Amount
Whole wheat flour	150 g
Sugar	60 g
Egg	1
Water	60 ml
Desi ghee, cream, oil	70 g
Peanuts	25g



Figure 1.13 Peanut Biscuits
Dough

Procedure:

Making whole wheat flour biscuits with peanuts is quite similar to making regular biscuits, with the key difference being the substitution of whole wheat flour with peanuts for all-purpose flour. Weigh all ingredients. In a large mixing bowl, whisk together the whole wheat flour, peanuts, baking powder, and salt and other ingredients until well combined. Subsequently, the leavened dough was left for 20 minutes at 37° C. Use a biscuit cutter or the rim of a glass to cut out biscuits from the dough. Press straight down without twisting to ensure the biscuits rise properly. It becomes soft and creamy type solid solution. Then take some quantity of dough on the dye and put in the dry Oven with the temperature of 180° C temperature for 20 minutes. After the biscuit prepared and analyzed from the different peoples.



Figure 1.14 Peanut Biscuit

Moisture Analysis of Wheat Flour and Quinoa Flour Biscuits:

Moisture analysis of biscuits serves a fundamental purpose in guaranteeing product quality and longevity of product. By accurately quantifying the moisture content of biscuits, manufacturers can assess and maintain consistency in their products. This analysis is pivotal in ensuring that biscuits meet desired texture, taste, and shelf life standards. Excessive moisture can lead to issues such as sogginess, while insufficient moisture can result in dryness or brittleness, both of which can significantly impact consumer satisfaction



Figure 1.15 weight the petri dish and petri dish with sample



Figure 1.16 weight petri dish after removing moisture

While performing this experiment first step is to weight the petri dish and pour the sample into petri dish and weight again and place the petri in hot air oven at 105⁰ C for 3 hours then removed the petri dish and cool it in desiccator for few minutes then weight again & this is the final results .Further calculation are given below :

Calculations:

Dish weight (w1) = 36.5
Sample weight (w2) = 10.2
(w1+ w2) (w3) = 46.7

Final Weight (w4) = 46.1 Formula:
$$\frac{w3 - w4}{w3} \times 100$$

$$\frac{46.7 - 46.1}{46.7} \times 100$$

$$\frac{10.2}{46.7} \times 100$$

$$\frac{10.2}{60}$$

$$10.2$$

Moisture % = 5.88

Ash Analysis of Wheat Flour and Quinoa Flour Biscuits:

Ash analysis of biscuits involves determining the mineral content present in the biscuits by burning a sample and measuring the residual ash. This process helps to quantify the inorganic components such as minerals, salts, and trace elements in the biscuit formulation. Moreover, ash analysis provides valuable insights for manufacturers to optimize formulations and enhance the nutritional profile of biscuits.



Figure 1.17 weight the crucible



Figure 1.18 weight the crucible with sample



Figure 1.19 temperature and time on muffle furnace

While performing this experiment first step is to weight the crucible and then pour the sample into the crucible and weight again and place the crucible into muffle furnace and set the temperature to at 700⁰ C for two hours and then remove the crucible from the muffle furnace and put it in the desiccator for cooling for few minutes and then wait again and this is the final weight . Further calculations are given below:

Calculations:

Weight of crucible
Weight of Sample (w1) = 42g
Weight of crucible with (w2) = 5.8g
(w3) = 42.3

Ash

$$\text{Ash \%} = \frac{w_2 - w_1}{W_s} \times 100$$

$$\text{\%} = \frac{42.3 - 42}{5.8} \times 100$$

$$\frac{5.8g}{0.3} \times 100$$

$$\frac{5.8g}{30}$$

$$\text{Ash \%} = \frac{5.8g}{30}$$

5.17

Crude Protein Analysis:

Crude protein refers to the total amount of protein in a substance, such as food products, determined by measuring the nitrogen content and converting it to protein using a conversion factor. It's a key nutritional component for animals and humans alike, essential for growth, repair, and overall health.

Sample Preparation:

- Collecting biscuit samples.
- Grinding the samples to a fine powder.
- Weighing the sample accurately.

Digestion:

- Adding the ground sample to a digestion flask.
- Adding concentrated sulfuric acid and a catalyst (usually a mixture of potassium sulfate and copper sulfate).
- Heating the mixture to break down organic matter and convert nitrogen into ammonium sulfate.

Neutralization and Distillation

- Cooling the digested sample and adding sodium hydroxide.
- Distilling the mixture to release ammonia.
- Capturing the ammonia in a boric acid solution.

Titration

- Titrating the boric acid solution containing the captured ammonia with a standard acid (usually hydrochloric acid).
- Calculating the amount of nitrogen present based on the volume of acid used.

Calculation of crude protein

$$\begin{aligned} \text{\% of Nitrogen} &= \left(\frac{\text{volume of acid (mL)} \times \text{Normality of acid}}{\text{weight of sample (g)} \times 14.007} \right) \times \frac{100}{1000} \\ &= \left(\frac{20.0 \times 0.1 \times 10}{14.007 \times 5} \right) \times \frac{10}{1000} = 0.56028\% \end{aligned}$$

Calculating the Crude Protein Content

- The conversion factor for nitrogen to crude protein is 6.25
- Crude Protein (%) = Percentage of Nitrogen \times 6.25
- Crude Protein (%) = $0.56028 \times 6.25 = 3.50175\%$
- The crude protein value is 3.50%

Results and Discussions

Results of Wheat Flour Biscuits:

The biscuit was served to different fellows and results are given according to their opinions. It was found crispy and sugar taste was good. Texture of the biscuits was good. The best biscuits for weight loss are whole wheat biscuits, as they have added nutritional value. Whole wheat biscuits are typically lower in saturated fats and higher in protein and fiber. The results are shown in

Figure 1.20 Wheat Flour *Biscuits*



Figure 1.20 Wheat Flour Biscuits

Results of Quinoa Flour Biscuits:

The biscuit was served to different fellows and results are given according to their opinions. It was found not crispy and overall taste was not good. Texture of the biscuits was good. Taste of biscuits was bitter and hard to swallow. The results are shown in figure



Figure 1.21 Quinoa Flour
Biscuits

Results of Wheat Flour & Quinoa Flour Biscuits:

The biscuit was served to different fellows and results are given according to their opinions. It was found crispy and sugar taste was average. Texture of the biscuits was good. Taste of biscuits was bitter at the end. The results are shown in Figure 1.22 Wheat Flour & Quinoa Flour Biscuits



Figure 1.22 Wheat Flour & Quinoa Flour Biscuits
Results of 70% Wheat Flour & 30% Quinoa Flour Biscuits:



The biscuit was served to different fellows and results are given according to their opinions.

It was found crispy and sugar taste was good. Texture of the biscuits was good. If you want to increase the nutrient content of your diet replace all purpose flour with wheat flour and quinoa flour. The results are shown in

Figure 1.23 70% Wheat Flour & 30% Quinoa Flour Biscuits

Results of Wheat Flour Biscuits with peanuts:

The biscuit was served to different fellows and results are given according to their opinions. It was found crispy and sugar taste was good. Texture of the biscuits was good. Whole wheat biscuits are typically lower in saturated fats and higher in protein and fiber. The results are shown in Figure:



Figure 1.24 Wheat Flour Biscuits with peanuts

Table 1.8 Treatments
Treatments:

T ₁	100% Wheat Biscuits
T ₂	70% wheat & 30% quinoa
T ₃	50% wheat & 50% quinoa

T ₄	100% quinoa
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Results of Moisture Analysis of Wheat Flour & Quinoa Flour Biscuits:

Table 1.9 Moisture Analysis of Wheat Flour & Quinoa Flour Biscuits

Samples	Weight before drying	Weight after drying	Moisture Content mean (%)
T1	47.8	46.9	7.96
T2	46.7	46.1	5.88
T3	47.7	47	6.25
T4	47	46.2	7.61

In the lab, various tests are performed, and moisture analysis is one of them. Moisture analysis is one of the important analysis to check the shelf life of the product. Moisture analysis is performed so many times and the different values of tests are given above but one is according to the standard i.e. (5.88%). So, the final result of the moisture analysis is (5.88%).

Results of Ash Analysis of Wheat Flour & Quinoa Flour Biscuits:

Table 1.10 Ash Analysis of Wheat Flour & Quinoa Flour Biscuits

Samples	Ash Content mean (%)
T1	7.6
T2	5.17
T3	5.76
T4	6.88

In the lab, various tests are performed, and ash analysis is one of them. Ash analysis is one of the important analysis to check the mineral content of the product. Ash analysis is performed so many times and the different values of tests are given above but one is according to the standard i.e. (5.17%). So, the final result of the moisture analysis is (5.17%).

Result of Crude Protein Analysis:

Wheat Biscuits: Approximately 6.5g protein per 100g

Quinoa Biscuits: Approximately 7.9g protein per 100g

So if we compared quinoa biscuits and wheat biscuits Quinoa biscuits have a higher protein content per 100 grams compared to wheat biscuits. It shows that after analyzing the 5g sample of 30% quinoa and 70% whole wheat flour biscuits our protein value is 3.5%

Sensory Evaluation Questionnaire: Biscuits:

We are interested in your feedback on different flatbread samples. Please taste each sample carefully and express your liking for each specific sensory property, according to the given scale;

1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly, 5 = neither like nor dislike, 6 = like slightly, 7 = like moderately, 8 = like very much, 9 = like extremely

Table 1.11 Sensory Evaluation Questionnaire

Aspects	100% wheat flour	70% wheat flour+30% Quinoa	30% wheat flour+70% quinoa	100% quinoa
Color	6	9		6
Flavor	5	7		3
Overall taste	9	6		1
Aftertaste	8	5		5
Texture	9	7		6
Aroma	8	4		6
Sweetness	6	5		1
Bitterness	7	5		3
Overall acceptability	9	7		4

Sensory evaluation of quinoa biscuits typically involves assessing various aspects like appearance (color, shape, size), aroma (smell), texture (crispiness, chewiness), and taste (flavor, sweetness, saltiness). After the evaluation different results shows that the biscuits which have 70% wheat flour and 30% Quinoa the most acceptable and the biscuits that have 50% Quinoa and 50% wheat flour are moderately acceptable. On the other hand, the biscuits which have 100% Quinoa that are bitter in taste and not acceptable

Conclusion

In lab, many experiments were performed where we made different types of biscuits that are made of these ingredients such as wheat flour & quinoa flour. After doing many experiments we analyze the best biscuit through our results. Through our results and feedback on sensory evaluation, we analyze that some of the biscuits were crispy and good in taste but some were bitter in taste. But the biscuit has 70% wheat flour & 30% quinoa flour and the biscuit has wheat flour with peanuts is very good in taste these biscuits were crispy and the overall texture was good. Both wheat flour & quinoa flour provide carbohydrates for energy and quinoa provides high protein, fiber content, and lots of minerals and vitamins as well. Also, quinoa flour in biscuits provides a dietary variety and ensures various nutrients are consumed. Through the experiments we found best moisture and ash analysis of these biscuits . We found 5.88 % of moisture and 5.17 % of ash and good consumer acceptability .

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