

Chapter 1: Introduction

1.1 Soup:

It was found that making soup was a quick and easy method of meal preparation. In the modern era, instant soup can serve as an alternative to breakfast due to its high caloric content, nutrient content, simplicity of preparation, and brief preparation time (Sunyoto et al., 2012).

Soup is a liquid form prepared from meat either chicken or other poultry meat & vegetable stock, adding other ingredients with them. There are a wide variety of ways to incorporate chicken and other ingredients into a soup.

In addition, the nutrients in a well-balanced diet are all present in the proper ratios. In addition to additives, different spices are added to soup (in plant proteins, carbohydrates, and other nutrients in powder form). A fiber-and-mineral diet. A nutritious diet should include a wide variety of foods. Carbohydrates account for 20-35 percent of total calories, and protein accounts for 10 to 35 percent of total calories. At least 45-65 percent of energy should come from fat, with the remaining 45-65 percent coming from carbohydrates. Non-nutrients like dietary fiber, antioxidants, and phytochemicals, which have health benefits, should also be included in a well-balanced diet. In addition to vitamins C and E, β -carotene is a source of antioxidants. Other phytochemicals, such as riboflavin and selenium, protect the body from free radical damage. Oxidative stress and cancer are both linked to a lack of antioxidants in our diets.

Supplemental ingredients such as spices (garlic powder, ginger powder), skim milk powder, and mixed herbs provide a complete nutritional source for a regular diet because of their nutritional contents.

In addition to their high antioxidant activity, these spices are among the most important sources of phytochemicals. Consequently, the soup can be an ideal healthy food for everyone when all of these sources are combined. Using mechanically dried chicken carcass powder, spices, and seaweed, the researchers set out to create an instant dehydrated soup mix. The country's citizens can eat a healthy diet thanks to their nutritional and sensory properties.

Soup is probably one of mankind's earliest culinary creations, having emerged around the same time that boiling was discovered as a method of food preparation. It's a very

efficient way to cook. In hot or boiling water, poultry, meat, seafood, or vegetables can be simmered until tender. Extracting the flavor creates a broth. Despite their differences in style, all of them are essentially the same. Boiling and heat-induced flavor extraction are both involved in the process of preparing soup. The interaction of composition and structure. When the word for "soup" was coined, it was originally derived from the Teutonic word, *suppa*. describes a medieval dish known as *sop*, which consists of a thick stew served over bread slices.to wick away the water. It's possible to classify soup as both a traditional and an appetizer, something hot to eat when you're sick in today's world, home-cooked soup has been supplanted by store-bought varieties, canned, dehydrated, and frozen commercially prepared instant soup. It takes a long time to get everything ready. Instant soup can be used as a substitute food for those who are on a diet,a nutritious and easy-to-prepare meal that provides a good start to the day. Cooked chicken and various other ingredients are simmered together to make chicken soup. For example, chicken soup is widely regarded as the world's most popular medicinal soup. Its common nickname, "Jewish penicillin," exemplifies its healing reputation. Bobamycin and bohbymycetin are two different names for the same drug. In addition to [2 and 3], Moreover, a bowl of soup would entice one's taste buds and encourage a steady flow of sips. These are the stomach's digestive juices, usually consumed before a meal. (Sarkar, 2019)

1.2 Effects of chicken instant soup in health

"Studies have shown that a hearty bowl of chicken noodle soup may help clear nasal congestion and ease cold symptoms," said Sandy Allonen, a clinical dietitian at Beth Israel Deaconess Medical Center in Boston. "It's all about the ingredients."

When you have a cold, it's also important to stay hydrated, she added.

"A clear broth is warm and soothing, making it a great source of hydration while you're sick, especially if you have a sore throat," Allonen said in a hospital news release.

- **Anti-Inflammatory effect**

Research on the impact shows that Some components of chicken soup have been shown to have an anti-inflammatory effect.

There may be a connection between the anti-inflammatory effects of soup and inhibiting neutrophil migration, and could theoretically alleviate some of the

symptoms of a medical condition. Chicken soup is a great way to start the day. Chicken soup has been the subject of extensive research.

- **Helps to inhibit Cellular Chemotaxis of Neutrophils**

In the past, chicken soup has been used to treat symptoms of upper respiratory tract infections. There are many infectious processes that can cause "colds," and it is likely that they all share a common inflammatory response, which could explain why chicken soup has been shown to have a beneficial effect. The Boyden blindwell chemotaxis chamber assay with zymosan-activated serum as chemoattractant was used to test a traditional chicken soup's ability to inhibit neutrophil migration. In a concentration-dependent manner, chicken soup significantly inhibited neutrophil migration. In a non-particulate component of the chicken soup, there was the activity. Even though only the chicken lacked cytotoxic activity, the soup's entire assortment of vegetables and meat had inhibitory activity. However, the soup as a whole was also free of cytotoxicity. There was a wide range of inhibitory activity in commercial soups. This research suggests that chicken soup may contain a number of compounds with beneficial medicinal properties. The soup's mild anti-inflammatory effect is one potential mechanism for reducing the severity of upper respiratory tract infection symptoms. (Ertl, 2009)

- **Effects in Peripheral Blood Flow in the Peripheral Circulatory System after Chicken Soup Consumption**

In research it has been proved that chicken soup helps to increase peripheral blood flow & also improve mood states such as decreasing anxiety & tension (Midoh, 2009)

- **Chicken Soup's Potentially Health-Promoting Effects**

Cooking chicken broth provides the body with heat, hydration, and nutrients that soothe the nervous system. Vitamins and minerals abundant in chicken broth make it an excellent remedy for illnesses like the common cold, the flu, and food poisoning. In addition, the broth's health benefits include the following:

- **Loss of weight**

Chicken soup is a great low-calorie option. It is possible to use chicken soup as a substitute for high-fat recipes or as a low-calorie snack, depending on your

preference. Chicken broth, when consumed as part of a healthy diet, can help prevent obesity and promote healthy weight loss. (webMD.com, n.d.)

1.3 Chicken Carcass

In the poultry industry, Chicken carcass is the part of bones & cartilage after removal of meat portions (leg, breast, wings, thighs). Chicken carcass has around 82.85% moisture, 11.8% protein, .29% lipids, 1.21% ash and 3.87% Carbohydrates also have some essential amino acids & collagen. It also has a unique flavor and taste.

In addition, compared to other types of meat, the price of industrial chicken carcass is relatively low in Bangladesh. You can get high-quality protein and other nutrients in a convenient form, as well as low-saturated fat and other benefits. As a result, poultry meat is suitable for people of all ages. The Chicken breast is frequently used in instant soup mixes. To save money, chicken carcass powder is used to make instant soup mixes in Bangladesh. For the powdered chicken carcasses, a cabinet dryer (a mechanical drying technique) is employed. By reducing the amount of water in the product, this drying method extends its shelf life and reduces the growth of microorganisms. It also prevents to reabsorb the moisture and can keep at room temperature for longer period.

1.4 Benefits of Chicken Carcass

- **Consists of High Content Macronutrient:** The amount of micronutrient is higher in chicken carcass than any other meat portions of chicken. Because, Bone has high content of minerals specially calcium, phosphorus and also other trace elements. Bone has also a bone marrow which is a fatty substance, while it is cooked, increases nutrient density, known as superfoods.
- **Helps to improve Gut:** Since it has a lot of collagen, glycine and gelatin it helps to improve Gut health, is an important factor for our immune system.
- **Flavorful:** Bone adds flavor to meat. It makes the meat juicy and tasty.
- **Less Expensive:** Chicken carcass Bone is not that much expensive like chicken boneless meat. Consumption of chicken carcass not only gives more nutrition but also helps to save money.

Aims & Objectives:

- To develop value added product with chicken by-product (Carcass).
- To develop a substitute for chicken.

Chapter 2: Review of literature

Instant food is very famous nowadays. Instant soup mix powder is the top most prominent food of them. People are taking soup much more than any other food item because of its availability & also its taste.

Soups are typically divided into two types: clear soups and thick soups. A study on soup powder formulation and nutritional status analysis was undertaken by Chandramouli et al. For their research, they used substances such as *Moringa oleifera*, *Centella asiatica*, and *Solanum trilobatum*. They basically employed the dried leaves of these species and discovered that corn flour was a suitable thickening agent and that coriander and pepper powder heightened sensory. Soups of numerous varieties are available on the market. Some soups are made with vegetables, while others have animal and fish ingredients. Instant soup helps people meet their nutrient requirements in less time. Sudarsan et al. discovered that instant soup contains nearly no sodium. (Monirul Islam, Vol.09 No.06(2018))

Formulation food products are increasing day by day to meet the requirements of the consumers [15]. The formulation on value added products are now the main target of the consumers. Because it can supply the nutritional value as well as delicious test to consumers. Monteiro et al. [17] conducted a study on the instant soup which was made from Tilapia (*Oreochromis niloticus*) and concluded that instant Tilapia soup can be used in food industry on additive material on making new food item. Udari et al. [18] conducted research on omega-3 containing soup powder and mentioned that instant soup is containing more omega-3 (9.31%) than fried fish. They used some ingredients like fish powder, fish oil, tomato, milk powder, salt, vegetables and spices for their research.

Instant soup is a major element of instant food which is highly preferred food of modern society for simple, easy and instant preparation characteristics. (Dhiman, 2001) conducted a study on storage ability of pumpkin instant soup is about six months. They used some other additive ingredients like moong pulse, tomato, spices and condiment's powder, pea, spinach and carrot for their study. Generally, people of developing country are suffering from malnutrition (Sarker, 2017). Instant soup may be a potential source to meet the demand of nutritional requirements. Rahman et al. (Rahman, 2017) conducted a study in Bangladesh on instant fish soup and concluded that the percent fish powder was the best composition other two composition. They

used ingredients like tomato, sugar, spices, cauliflower and salt for their study. Legume is a good source of vitamins, minerals and dietary protein. Rokshana et al. (Rokhsana, 2008) conducted a research work on development and storage quality of soup powder which was made from legume and vegetables and reported that the quality was as usual up to six months. (Monirul Islam, Vol.09 No.06(2018)).

Vipandeep Singh et al. conducted research on development, formulation and shelf-life evaluation of baby corn soup mix from industrial by-products (Singh, 2019)

In the poultry industry, after slaughtering, two types of by-products have been found- one is edible and the other is non-edible. Non-Edible by-products are usually discarded due to its no usability in traditional practice & to avoid microbial contamination. Edible by-products are sold at a cheaper rate. But it gets a due attention from scientific world. Now analysis shows that Chicken by-product especially chicken carcass is a great source of minerals, collagen, amino acids and gelatin. So, chicken is a potential item in terms of low price, high availability, easy processing and good source of nutrition. Literature survey shows that there are so many researches have already done but a very few researches are found on chicken by product based instant soup mix. The piece of study was undertaken to address the research gap and considering importance of the subject matter.

Chapter 3: Materials and methods

3.1 Experiment area

This experiment was conducted in the laboratory of department of food processing & engineering, factory of IG Foods Ltd.

3.2 Experiment Duration

After starting on January, the experiment lasted for five months.

3.3 Sample Collection

Chicken Carcass was collected from the poultry industry & other spices were purchased from modern trade & local market.

3.4 Preparing the raw materials

3.4.1 Preparation of chicken carcasses in industrial settings:

Drying the carcass of an industrial chicken began with it being washed and chopped. Diced industrial chicken carcasses were dehydrated using the mechanical-drying method. 70°C and 72 hours were the drying temperature and time.

Between 24 and 72 hours are needed for drying. The moisture content (percent), protein content (percent), lipid content (percent) and color of the cabinet-dried chicken carcass meat were then determined. The experiments were done three times over.

Process

Carcasses were cut into small pieces and washed properly to remove the blood. Then they were placed in a tray keeping a little distance among them & put the trays in the cabinet dryer. The dryer temperature was set at 70°C. After 24 hours, the trays were brought out of the dryer to see if there was any oil on the carcass. The oil was removed with a tissue & again they had been put in the dryer. Then they were dried again for 48 hours & the carcasses were prepared for grinding. Carcasses were made powder form in a mixer grinder.

3.5 Procedure for drying a product.

The experimental drying data was analyzed using the decrease in moisture ratio as drying time increased. Calculation of the moisture ratio (MR) was done as follows: This equation is: $MR = M/M_o$ (Doymaz, 2007a), which is the moisture content at any point in time of drying and the initial moisture content (kg water/kg dry matter).

The drying characteristics of plant materials were described by fitting the moisture ratio curves with the Page model (Singh et al., 2008).

3.6 Instant soup mix formulation

To create a soup mix, all of the ingredients were combined in four different formulations according to the predetermined ratios for each ingredient (Table 1). There are a total of one hundred and one components. At issue here was figuring out the product's moisture content in terms of both percentage and water activity (a_w). When conducting sensory evaluations, the quantitative description method was used (QDA). In order to calculate the total energy (kcal) and percentage of energy supplied by the chosen mixing formula, the percentage daily value (percent DV) was established.

Cooking procedures of soup powders: 20 g of mixed soup was added into 300 mL water and boiled for 15-20 mins and readied for serving one person.

Table 1: Formulations of instant soup mix powder

Ingredients	Formulations (weight in gm)			
	Sample-1	Sample-2	Sample-3	Sample-4
Chicken Carcass Powder	20.62	16.49	24.74	12.37
Ginger powder	2.06	2.06	2.06	2.06
Mixed herb	4.12	4.12	4.12	4.12
Basil	1.03	1.03	3.09	3.09
Cardamom	2.06	2.06	2.06	2.06
Chicken Seasoning	16.49	16.49	16.49	16.49
Chili flex	2.06	2.06	2.06	2.06
Corn flour	41.24	45.36	37.11	49.48
Skim milk	6.19	6.19	3.09	3.09
Salt	2.06	2.06	3.09	3.09
Garlic powder	2.06	2.06	2.06	2.06
Total	100	100	100	100

3.7 Proximate analysis

Analyzing food for macromolecules using proximate methods is called macromolecular quantification. Protein, fat, moisture, ash, and carbohydrates can all be measured using a variety of methods, including extraction, Kjeldahl, and NIR.

3.7.1 Determination of Moisture Content

One of the most critical and widely used measurements in food processing and testing is moisture determination. Food processors and consumers alike are concerned about moisture content because it is directly related to the amount of dry matter in a serving. Moisture, on the other hand, has a far greater impact on the stability and quality of food. Using the Association of Official Analytical Chemists' standard procedure, we were able to determine the amount of moisture present (AOAC, 2016).

Calculation: The percent of moisture was calculated as follow

$$\text{Moisture \%} = \{(\text{Initial weight} - \text{Final weight}) \div \text{Sample weight}\} \times 100$$

3.7.2 Total solids

Total solid was determined by methods of AOAC (2016). Percent total solid content was calculated by using the data obtained during moisture estimation using the following formula:

$$\% \text{ Total solids} = 100 - \% \text{ moisture content.}$$

3.7.3 The amount of ash in the soup mix

AOAC methods were used to measure the amount of ash present (2016). The inorganic residue left over after organic matter has been destroyed is referred to as the ash content. A weighed crucible containing 10 grams of dried instant soup mixed was used. After that, it was charred to ashes. To remove the charcoal, the charcoal was heated in a muffle furnace for four hours at 600°C. After that, the crucible was removed from the furnace. It was weighed after it had been thoroughly dried out using a desiccator.

Calculation: The following expression was used to determine the ash content.

$$\text{Ash \%} = (\text{The amount of the ash supplied sample} \div \text{Sample weight}) \times 100$$

3.7.4 Estimation of Crude Fat

Dissolving food samples in organic solvents (chloroform and methanol) and separating the filtrate by filtration are used to estimate the amount of crude fat in food. The extract is measured and the fat content is estimated after the filtrate is separated into separate funnels and dried. A Soxhlet apparatus was used to determine the crude fat content of the samples according to AOAC (2016) methods.

Calculation: The crude fat content was calculated using the following formula:

$$\text{Fat (\%)} = \text{Weight of the extract} \div \text{Sample weight} \times 100$$

3.7.5 Crude protein Determination

Organic and inorganic materials can be analyzed using the Kjeldahl method, which measures nitrogen content. Food and drink, meat, feeds, cereals, and forages are all tested for Kjeldahl nitrogen, which is used to calculate protein content. Additionally, the Kjeldahl method is employed to determine nitrogen levels in a variety of sample types, from wastewater to soil. It is a recognized procedure that is detailed in a number of regulatory documents, including (AOAC, 2016).

Calculation: The type of receiving solution and any dilution factors used during the distillation process must be taken into account when calculating percent nitrogen or percent protein. These equations use "N" to represent normality. Depending on whether standard acid or boric acid is being used as the receiving solution, the term "ml blank" can refer to either the milliliters of base required to back titrate a reagent blank or the milliliters of standard acid required to titrate the reagent blank. The equation is as follows when boric acid is used as the receiving solution:

Nitrogen % = $\{(ml \text{ standard acid} - ml \text{ blank}) \times N \text{ of acid} \times 1.4007\} \div \text{weight of sample in gram}$

3.7.6 Crude Fiber Estimation

Water-insoluble carbohydrate is known as crude fiber because it contains cellulose, hemicellulose, and lignin as the main components. It is estimated by boiling a known quantity of fat-free food sample for 30 minutes in a weak acid solution (1.25 percent H₂SO₄), followed by 30 minutes of boiling in a weak alkali solution (1.25 percent NaOH), all at constant volume, and then subtracting the ash from the resulting residue to arrive at an estimate. The AOAC method was used to determine the crude fiber (2016). A muffle furnace was then used to burn the ash residue until it turned white (550-600°C, 4-6 hours).

Calculation: The percentage of crude fiber in a sample is determined as follows:

$$\% \text{ Crude fiber} = (W - W_1) / W_2 \times 100$$

Here,

W= Weight of crucible, crude fiber and ash

W₁=Weight of crucible and ash

W₂= Weight of sample

3.7.7 Carbohydrate content:

It was determined by subtracting the Nitrogen-Free Extractive from the Carbohydrate Content (NFE). It was given as the difference between 100 and the sum of the other proximal components.

Calculation: Because of this, the formula was used to calculate it,

$$\% \text{ CHO} = 100\% - (\text{Protein} + \text{Fat} + \text{Fiber} + \text{Ash} + \text{Moisture content})$$

3.7.8 The calculation of energy consumption

It was calculated by multiplying the amount of protein, fat, and carbohydrate in the chicken carcass with a formula for determining energy content (Baer et al., 1997).

$$\text{Energy} = (\text{Protein} \times 4.1) + (\text{Fat} \times 9.2) + (\text{Carbohydrate} \times 4.1)$$

3.8 Study Cost

The total cost of the ingredients used to make the chicken instant soup mix powder, including the chicken carcass was used to calculate the price of the instant chicken soup mix powder. The price per 40gm of instant soup mix powder was calculated from the taka amount.

3.9 Sensory evaluation

Sensory evaluation was performed for the determination of overall acceptability of the final product by the consumers. A taste-testing panel evaluated the consumer's acceptability of developed product. The panel test was done in the CVASU premises where the panelists were both the teachers and students of CVASU. Panelists of 15 persons were given the product that has been developed from chicken carcass. There were 4 formulations which were encoded with sample 1, sample 2, sample 3, and sample 4. The six samples were tasted by the panelists without informing them the formulations. The panelists were requested to assign appropriate score for sensory attributes of appearance, color, flavor, texture, taste, spiciness and overall acceptability of soup. This method does not, of course, reflect actual consumer perception, but it does strongly indicate attributes which a good quality product should possess (Sing et al., 2008). They tasted four samples expressed their opinion giving score about. Sensory evaluation of qualitative parameters (taste, appearance, flavor, viscosity, spiciness and overall acceptability) of the four samples was carried out using seven-point Hedonic scales (Larmond, 1977). The scale was arranged such that:

Table 2: Rating Scale for sensory evaluation Ranks

Characteristics	Scores
Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like nor dislike	5
Dislike slight	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

3.10 Statistical Analysis

Excel 2016 spreadsheets were used to collect and store data in order to perform statistical analyses. There were three sets of each sample. Chicken Soup's sensory evaluation and composition were both subjected to descriptive statistics (mean and standard deviation). IBM SPSS Statistics 25 was used for sorting, coding, and recording the results of the study. A statistical analysis was then carried out. There was significant level of variation at 95% confidence interval in proximate composition, and sensory evaluation data using One-way ANOVA procedures. A "Tukey" post hoc test was used to determine the degree of variation among the sample groups. At a 5% significance level (p^0), the statistical analysis was carried out.

Chapter 4: Results

4.1 Chemical Properties of Chicken Carcass

An investigation into the chemical composition of the industrial chicken carcass used in soup mix was carried out by scientists. Moisture was 5.80%, protein was 49.30%, and fat was 26.10% percent. According to my fitness pal website, the crude protein in carcass ranged from 48% to 57% and the fat content ranged from 25% to 43%. Depending on how the birds are fed, the meat's chemical composition can vary greatly.

4.2 Chemical properties of corn flour & other spices

The corn flour contains Crude fat (5.83%), protein (19.66%), carbohydrate (62.31%), fiber (3.67%), ash (1.85%), and calorific value (442.99 Kcal/100 g)

Skim milk contains less than .5% fat, 36% calories.

Ginger powder has 5.02 to 5.82 percent protein, 4.97 to 5.61 percent crude fiber, 0.76 to 0.90 percent fat, and a range of 3.38 to 3.66 percent ash. There were 0.81 mg/100 g of -carotene and 3.83 mg/100 g of ascorbic acid in ginger powder.

4.3 Proximate analysis of Chicken instant soup powder

The analysis shows that this chicken carcass instant soup powder contains 6.33% moisture, crude fibre 1.05%, ash 15.30%, fat 7.27% & protein 19%

4.4 Cost Analysis

Table 3: product cost

1. Raw material cost			
Ingredients	Weight in gm	Tk per kg	Tk per 48.5gm
Chicken Carcass Powder	8	100	0.8
Ginger powder	1	2000	2
Mixed herb	2	8500	17
Basil	0.5	5000	2.5
Cardamom	1	6000	6
Chicken Seasoning	8	1500	12
Chili flakes	1	1000	1

Corn flour	22	200	4.4
Skim milk	3	377	1.131
Salt	1	35	0.035
Garlic powder	1	550	0.55
Total	48.5	25262	47.416
2.Processing cost 15% of raw material		3790	7.114
3.Packing cost		5tk per piece	
Total production cost			59.5

Per pack soup mix contain around 48.5 gm powder, which price will be 60tk

4.5 Energy content

Total energy contains per 100 gm chicken carcass instant soup mix powder 357.34 Kcal.

4.6 Standardization of soup mix

In Table 4, the components used to make soup are rich in nutrients that provide energy. As the amount of carbohydrate and lipids in the formula increased, energy levels rose.

Table 4: Total energy provided by carbohydrate, protein and fat in 4 formulas of mixed chicken instant dried soup (in 100 g)

Formula	Carbohydrate (g)	Protein (g)	Lipid (g)	Total Energy (kcal)
1	50.06	17.23	8.94	358.14
2	52.1	19	7.27	357.34
3	53.1	15.62	8.06	355.90
4	53.57	15.76	7.32	351.59

4.7 Nutrient content, energy yield, and (formula 2).

Table 6 shows the percentage of energy provided by major nutrients in formula 2.

Diets that are macronutrient-balanced can help people live healthier lives and lose weight in the long term. An energy source's macronutrient distribution ranges (AMDRs) have been linked to a lower risk of chronic disease while providing essential nutrients, such as calcium. The risk of chronic disease and/or deficiency in essential nutrients can be increased if the AMDR is exceeded. As a percentage of total calories, adults should consume between 10% and 35% protein, 20% to 35% fat, and 45% to 66% carbohydrate. Carbohydrate, protein, and fat-rich foods also contain other essential nutrients. To get enough micronutrients, it is important to maintain a proper macronutrient ratio as well.

The macronutrient percentages of carbohydrates, proteins, and lipids in this formula were found to be within the AMDR, with 59.8, 21.8 & 18.7 percent, respectively. Unbalanced macronutrient profiles may increase the risk of adverse health consequences, so a balanced diet is recommended for long-term weight loss success.

Table 5: Macronutrients content, yielding-energy and percentage of energy providing from 100 g of mixed chicken carcass soup

Nutrients	Content (g)	Energy-yielding nutrients (kcal)	Percentage of energy providing from nutrients
Carbohydrate	52.1	213.61	59.8
Protein	19.00	77.9	21.8
Fat	7.27	66.884	18.7
total		358.39	100

Table 6: Nutrition Fact

Nutrition Fact		
2 serving per pack 48.5gm		
Serving size: 24.25gm		
Amount per serving calories 80		
Calories from fat 18.7		
% Daily Value		
Total Fat	3.5 gm	4.8%
Cholesterol	6.2 mg	2.06%
Sodium	60 mg	2.5%
Total CHO	24.8g	4.9%
Total fibre	.51g	3.9%
Protein	9.25g	
Calcium	26.7mg	3.2%
Potassium	75.79	2.2%

4.8 Sensory Evaluation

Organoleptic value, in addition to nutritional value, is a critical determinant in consumers' product selection decisions. When making a mixed soup, finding the right ratio of ingredients is crucial because it not only ensures a healthy diet but also improves the soup's taste. Using the quantitative descriptive analysis method, we evaluated the instant soup's sensory properties.

All of the sensory metrics were found to be statistically indistinguishable ($p>0.05$) (table 3). Sample 2's acceptance rate was the highest across the board. However, sample 4 received the least amount of positive feedback.

Table 7: Hedonic rating test for sensory evaluation of chicken carcass soup

Formulation	Taste	Spiciness	viscosity	Flavor	Appearance	Overall Acceptability
Sample 1	7.07±0.46a	8.33±0.49ab	8.00±0.48a	7.87±0.64ab	7.60±0.51ad	8.00±0.53ab
Sample 2	7.73±0.70b	8.60±0.51ab	8.60±0.51b	8.20±0.68ab	8.47±0.52bc	8.60±0.51a
Sample 3	7.73±0.46b	8.20±0.56ab	7.87±0.52a	7.93±0.59ab	8.27±0.70bcd	7.93±0.80b
Sample 4	7.80±0.66bc	8.07±0.47a	7.87±0.35a	8.00±0.65ab	7.87±0.35acd	7.73±0.59b

Legends: Means ± SD and within the column bearing different superscripts (a, b, c) are not significantly different (P< 0.05).

Chapter 5: Discussions

5.1 Chemical properties of industrial chicken in Bangladesh

Protein, fat, and minerals are plentiful in these by-products. These by-products are rich in nutrients, so it's important to encourage the development of new food products through improvements in meat processing techniques in order to make them more widely available as food. Research shows that Chicken has about 16.44 -23.31% protein, 0.37 -7.20% fat, 0.19 -6.52% ash, and 72.8 -80.82% moisture content, which is about similar to chicken carcass powder. Chicken carcass is a great source of protein, fat & ash. (Nguyen, 2020)

5.2 Comparison of Nutritional Composition of Chicken Carcass & chicken

For every 100 grams of delectable chicken, fat 20-35%, Carbohydrate 45-65%, protein 10-35% where chicken carcass has about similar nutrition facts like chicken meat. So, it can be a good alternate for chicken meat. (Heerden, 2002)

5.3 Effects of drying process in Chicken carcass

Chicken is a perishable food which has high moisture content & also chicken boned part can't be meshed without drying. To increase shelf life of chicken instant soup mix powder & to make a fine powder soup, drying of carcass is necessary. A certain temperature & pressure in drying helps to prevent microbial growth in food. Chicken carcass drying temperature is 70⁰ C & time 72 hours. This product was dried at different times (12 hours,24 hours,72hours) to meet the moisture requirements. The moisture content of the carcass reached up to 6 - 8% after 72 hours.

Drying increases the protein content of chicken carcass which was around 20%, it has become 49% after drying. Similarly, the fat content also increases from 20% to 26%. In the process of drying, heat and moisture exchanges occur simultaneously. During this process, moisture leaves the food as a vapor, but the oil and other content remain essentially unchanged.

Cabinet dryer was used in carcass drying. Solid foods are batch dried in cabinet/tray dryers on a small to moderate scale (say, 2000 to 20 000 kg per day). They're cheap to buy and easy to put together. Cabinet dryers have a closed compartment into which trays of food to be dried are inserted and removed as needed (Fig. 32.1). The trays are placed on shelves with enough room for them to spread out. Between the shelves,

heated, dry air is circulated. Tray bottoms are frequently slotted or perforated to allow air to flow through the trays as well. The material's moisture content is affected by where it is placed on the tray. Those materials closest to the dry air's inlet have the lowest relative humidity of the entire structure. The trays can be rotated or the air flow can be reversed in order to ensure even drying. To ensure that the drying air is evenly distributed throughout the cabinet, movable baffles are commonly used. In rural areas, cabinet driers are commonly used to dry fruits (grapes, dates, apples), vegetables (onion, cabbage), and herbs (thyme, sage, rosemary) (parsley, basil, mint, dill). Typical air inlet temperatures are between 60- and 80-degrees Celsius. To prevent dry particles from being entrained in the wind, the air velocity must be adjusted to a few $\text{m}\cdot\text{s}^{-1}$ depending on the size, shape, and density of the food particles. Batches can last anywhere from two to ten hours, depending on the product and the environment. Adjustable air recirculation is common in cabinet dryers. As drying progresses, the air exiting the cabinet becomes warmer and less humid, increasing the rate of recirculation. The energy savings from recirculation are substantial.

Batch-operated, multipurpose hot air driers like this one are available. A fan, an air heater, and trays of food are all housed inside an airtight cabinet that's been insulated. Food can be placed on trays or pans in relatively thin layers up to several centimeters in Cabinet dryers. It is through the heater coils that fresh air is blown across the food trays and out of the cabinet. The indirect method is used to warm the air in this instance. Screens keep the air clean by removing any dust that might be present. Some designs have perforated trays, which allow air to be directed upwards through the perforations rather than across and between the trays. Instead of being re-circulated, the air exits the system and is expelled back into the atmosphere. Heating energy can be conserved by reusing some of the warm air in a recirculation system. To avoid saturation and slowing down subsequent drying, it may be necessary to dry moist air before it is re-circulated in re-circulating designs. Passing the moist air over cold plates or coils could condense it out. It's important to keep the exhaust vent away from the fresh air intake area if the exhaust air isn't going to be dried for re-circulation. Otherwise, the moist exhaust air will be drawn back through the dryer, reducing drying efficiency. A cabinet dryer is typically used in small businesses. When it comes to setting drying conditions, they are relatively inexpensive. A 95°C dry bulb operating temperature and air velocities between 2.5 and 5 m/sec per tray are possible with trays as high as 25 m high on these machines. They are commonly used to dry fruit and vegetable pieces, and the

drying time can range from 24 to 72 hours, depending on the food and the desired final moisture.

5.4 The impact of a healthy diet's ingredient proportions

A healthy diet is one that aids in the preservation or enhancement of one's general well-being. Fluid, macronutrients, micronutrients, and adequate calories are all essential components of a well-balanced diet. (Nguyen, 2020)

5.5 Hydrologic properties such as relative humidity and specific activity of water

Water activity (a_w) and moisture content (ranging from 7.036 ± 0.456 to $7.506 \pm 0.569\%$) were not significantly different among the products made using four different formulas, with values ranging from 0.208 ± 0.009 to 0.210 ± 0.012 percent, respectively. Microorganisms can grow down to an a_w of 0.60. Halophilic bacteria, on the other hand, can thrive at a_w values as low as 0.75, which is well below the average a_w of 0.87. (Beuchat et al., 2013). *S. aureus* can grow at an a_w of as low as 0.83 under ideal conditions, according to the International Commission on Microbiological Specifications for Foods (1996).

5.6 Sensory Evaluation

Additionally, organoleptic value is a significant factor in consumers' product selection decisions, even if nutritional value is the most important consideration. Soup processing requires determining the proper mixing ratio of ingredients, which not only provides nutritional balance but also enhances the product's flavor.

The flavor of nutritional soup is distinctive. In the nutritional soup, milk powder has the strongest aroma, which enhances its flavor and makes it more enticing to eat. In order to achieve a distinct flavor, the formula IV included a significant amount of milk powder.

From formula I to formula IV, the consistency of nutritional soup products progressively deteriorated. The vast majority of consumers opted for Formula 2. A increase in corn flour from formula I to formula IV may be to blame, as the product was too thick and viscous for consumers. The results showed that the product has a straw yellow color and a bright and attractive seaweed green color due to the proper concentration of the ingredients mixed in formula 2. It was determined that formula 2 would be a good standard sample based on the data collected and the sensory evaluation. (Nguyen, 2020)

5.7 Energy contents

Calories (based on the 2,000-calorie diet) In terms of caloric intake, 40 calories are considered low, 100 calories are considered moderate, and anything over 400 calories is considered excessive. A moderate amount of energy is required to produce this product's calculated output (80 calories). On the Nutrition Facts label, the percentage DV is a guide to the nutrients in a single serving. Some diseases and conditions can be less likely to develop if you consume enough of this nutrient. Fat, saturated fat, trans fat, cholesterol, and sodium are just a few of the things that have been labeled as having a maximum amount allowed. Cholesterol (2.06%), fat (4.8%), sodium (2.5%) and carbohydrate (4.9%) were all less than 5% of the DV, indicating that this product is well-balanced in terms of nutrition. Chronic diseases like heart disease, some cancers, and high blood pressure may be made worse if these substances are consumed in excess. Saturated fat, trans fat, and cholesterol should be avoided as much as possible as part of a healthy diet, according to nutritionists. In spite of this, the product has a low fiber content (percent daily value is 3.9 percent), calcium (3.2 percent), potassium (2.2 percent). Consumption of herbs and spices that are high in dietary fiber and contain nutrients like calcium, and potassium should therefore be incorporated into the diet. Percent DVs are based on a 2,000-calorie diet, as noted in the nutrition label's Footnote. All food labels must include this information. For breakfast or lunch, this product can provide some of the energy and nutritional value needed.

5.8 Quality of chicken soup that has been refrigerated

Products need to be kept safe and secure. Zipper-re closable aluminum bags double-sided were chosen as the packaging for the products to be studied. There was no change in the product's moisture content or water activity after five months of storage, 6.33 percent and 0.21-0.004 percent, respectively. It has also been found that the product's organoleptic value is excellent. (Nguyen, 2020)

Chapter 6: Conclusion

The chicken carcass soup powder has been developed. This product's Nutrition Facts label is based on computer-generated data, making it a good choice for consumers with varying health conditions. This soup powder can be safely stored for up to five months in terms of its physicochemical and microbiological properties. Soup powder is being developed as a good option for meeting nutritional needs, especially in the prevention of protein-energy malnutrition in our country, because it contains all the nutrients from various materials and has a proper energy balance. Chicken carcass instant soup mix powder can be a good alternate with chicken instant soup mix. In this way, we can do both things increasing by product's value & also a nutritious substitute.

Future Directions and Recommendations

More than half of Bangladesh's population is malnourished today; chicken soup could serve as a good source of nutrients and energy in these situations. We've come to a positive conclusion regarding the development of chicken soup. As a result, it has a higher monetary value and is easier to sell. The procedure from medium and large-scale production can be adopted by modern food industries. In light of the findings to date, the following suggestions and prospects for future research are put forth by the authors.

- ✓ In order to confirm the experimental results, the current studies may be repeated.
- ✓ As a second option, you can experiment with a variety of recipes and vegetable & spices ratios to create a instant mixed soup powder.
- ✓ For one, it is simple to put together. it will be beneficial for all people
- ✓ Other poultry which are cheap & available such as turkey meat and the like, should also be studied in this way.
- ✓ Packaging and storage conditions for chicken carcass are to be improved.
- ✓ Because of its nutritional value, the findings will be beneficial from a therapeutic standpoint.
- ✓ Accordingly, statistical comparisons between analytical data could be made, despite a small sample size (g). Our findings should be taken with a grain of salt due to the small number of samples analyzed and the need for further research.
- ✓ Enough steps should be taken to improve the nutritional value of commercially available soup.

References

- Arunkumar, D., Avinash, N.G., Rao, H., Robin, K.B. and Samshuddin, S. 2015. Estimation of calcium, potassium and sodium contents in commonly consumed food of Karnataka coastal belt region, India. Pelagia Research Library. *Der Chemica Sinica*, 6(4), 100-103.
- Beuchat, L.R., Komitopoulou, E., Beckers, H., Betts, R.P., Bourdichon, F., Fanning, S., Joosten, H.M. and Kuile, B.H.T. 2013. Low–Water Activity Foods: Increased Concern as Vehicles of foodborne Pathogens. *Journal of Food Protection*, 76(1), 150–172.
- Dinh, T.T.N., Blanton, J.R., Brooks, Jr. J.C., Miller, M.F. and Thompson, L.D. 2008. A simplified method for cholesterol determination in meat and meat products. *Journal of Food Composition and Analysis*, 21(4), 306-314.
- Gopalan, C., Ramasastry, B.V. and Balasubramanian, S.C. 1991. Nutritive value of Indian foods., p. 47. Hyderabad: National Institute of Nutrition.
- International Journal of Agriculture and Food Science Technology*. 2016. ISSN 2249-3050 Volume 7, Number 1, pp. 1-6.
- Kumar, R.P. and Rani, M.S. (2014). Chemical composition of chicken of various commercial brands available in market. *IOSR Journal of Agriculture and Veterinary Science*, 7(7), 22-26.
- Mc C seady, R.M. 1970. Determination of starch and dextrin in methods of Food Analysis, 2nd edition. A series of monographs, D.225-227. London, UK: Academic Press.

- Ngo Van Tai, Nguyen Minh Thuy, Tran Linh Triep, Le Thuy Hang and Nguyen Thi Truc Ly. 2019. Formulation of instant soup powder from freeze-dried shrimp and locally available vegetables. *Journal of Vietnam Agricultural Science and Technology*, 6, 100-104.
- Pisulewski, P.M. 2005. Nutritional potential for improving meat quality in poultry. *Animal Science Papers and Reports*, 23(4), 303–315.
- Budianto. (2021). utilization of chicken bone be as a substitute for chicken broth Agar. *International Journal of Current Research*, 4.
- Cordeiro, A. (2019). In Recovery and application of bioactive proteins from poultry by-products.
- Dhiman, A. V. (2001). Studies on Development and Storage Stability of Instant Vegetable Pulav Mix. . *Journal of Food Science and Technology*,, 38, 231-234.
- Ertl, R. F. (2009, november). chicken soup inhibits neutrophil chematexis.
- Heerden, S. M. (2002). Nutrient Content of South African Chickens. *Journal of Food Composition and Analysis*.
- Midoh, N. (2009). Effect of Chicken Soup Intake on Mood States and Peripheral Blood Flow in Humans. *journal of health science*.
- Monirul Islam, M. N. (Vol.09 No.06(2018)). Development and Quality Analysis of Protein Enriched Instant Soup Mix. *Food and Nutrition Sciences*, 13.
- Nguyen, T. M. (2020). Development and nutritional analysis of healthy chicken soup supplemented with vegetables in Viet Nam. *Food Research*.

- Sarkar, B. (2019). Development and quality evaluation of instant. *Journal of Entomology and zoology studies*.
- Singh, V. (2019). Development, formulation and shelf life evaluation of baby corn soup mix from industrial by-products. *Food Science and Technology*, 57.
- webMD.com. (n.d.). Retrieved from Nourish by webMD Chicken Broth: Are There Health Benefits?
- Sarker, M.N.I., Bingxin, Y., Sultana, A. and Prodhan, A.S. (2017) Problems and Challenges of Public Administration in Bangladesh: Pathway to Sustainable Development. *International Journal of Public Administration and Policy Research*, 3, 16-25.
- Rahman, M.A., Saifullah, M. and Islam, M.N. (2012) Fish Powder in Instant Fish Soup Mix. *Journal of the Bangladesh Agricultural University*, 10, 145-148.
- Rokhsana, F., Yeasmin, R. and Nahar, A. (2008) Studies on the Development and Storage Stability of Legume and Vegetable Based Soup Powder. *Bangladesh Journal of Agricultural Research*, 32, 451-459.

Appendices

Appendix-A: Proximate Analysis report

Department of Animal Science and Nutrition
Chattogram Veterinary and Animal Sciences University
Khulshi, Chattogram-4225, Bangladesh
Phone: 02334466153, 02334466154, Fax: 02334466270

Proximate Analysis Report

Name of the owner:

Date of entry: 27/06/2022

Ulfat Tasnim

Sample ID: June-05-06

MS Student

Dept. of Applied Chemistry and Chemical Technology

Faculty of Food Science and Technology, CVASU

Sample Name: Chicken by-product powder

Sample Code	Dry matter	Moisture	Crude Fiber CF %	Ash	Ether Extract/Fat %	Crude protein CP %
Sample No: 01	92.73	6.70	1.67	17.07	8.94	17.23
Sample No: 02	93.67	6.33	1.05	15.30	7.27	19.00
Sample No: 03	91.69	7.02	1.10	16.20	8.06	15.62
Sample No: 04	93.26	6.92	1.56	15.76	7.32	16.43
Sample No: 05 Brown(chicken powder)	94.20	5.80	0.25	15.26	26.10	49.30

Note: The results indicated above are only for the sample supplied (Fresh Basis).

Appendix-B:

Sensory evaluation through Hedonic test of chicken instant soup powder

Name:

Age:

Date:

You are receiving the coded samples. Please taste them and circle them on the scale which best represents how much you liked or disliked each sample with respect to overall acceptance.

The scale is arranged such that; Like extremely =9, Like very much =8, Like moderately =7, Like slightly=6, Neither like nor dislike =5, Dislike slightly =4, Dislike moderately =3, Dislike very much =2, and Dislike extremely =1.

Here,

- ✓ Sample-1: 20.62% chicken carcass added
- ✓ Sample-2: 16.49% chicken carcass added
- ✓ Sample-3: 24.74% chicken carcass added
- ✓ Sample-4: 12.37% chicken carcass added

Table 9: Sensory evaluation through Hedonic test of chicken instant soup powder

Hedonic	Taste				Flavour				Appearance				Mouth feel				spiciness				Overall Acceptability				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Like Extremely																									
Like very much																									
Like moderately																									
Like slightly																									
Neither like or dislike																									
Dislike slightly																									
Dislike moderately																									
Dislike very much																									
Dislike extremely																									
Comments																									

Appendix-C: Photo Gallery

1. Chicken Carcass



2. Preparing carcass for drying



3. Carcass drying in a cabinet dryer



4. Grinding Carcass



5. Adding Ingredients for different Formulations



6. Preparing soup for testing



7. Proximate Analysis



Crude fibre Determination



Protein Digestion



Fat Determination



Ether extraction

8. Sensory Evaluation



Brief Biography

Ulfat Tasnim graduated from Bakolia Govt. High School in 2011 with a Secondary School Certificate and Higher Secondary Certificate in 2013 from the Chittagong Government women College. From the Faculty of Food Science and Technology at the Chattogram Veterinary and Animal Sciences University, she earned her B.Sc. (honors) . Now, She,the Master of Science degree in food chemistry and quality assurance, is being pursued from Chattogram Veterinary and Animal Sciences University,is currently working on her dissertation (CVASU). She is passionate about working to develop new healthy product for improving people's health and ensuring quality of those products.