



Practicum Guidebook

Food Formulation

In the First 1000 Days of Life



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FOREWORD

Our gratitude goes to Almighty God upon His abundance of mercy and grace so that this practicum guidelines for Meal Formulation of the first 1000 days of life/1000 HPK group of age can be fully completed.

This practical guide is one of the guidelines used to make it easier for students to understand the procedures in food product development.

It is expected to make it easier for students to design superior products based on implicated research with a clear vision so that the product can reach the appropriate target and can be used to solve nutritional problems in Indonesia.

The arrangement of these practicum guidelines may not be completely perfect, so suggestions and constructive criticisms are highly desirable for improvement. We also extend our thanks to all those who participate so it can be completed and implementation of the practicum can be done very well.

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Authors

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I. Introduction

Practicum Objectives

Students can understand and identify nutritional problems as well as the importance of food product development attempts to solve nutritional problems.

Teaching Methods

Practice and Discussion

Material and Tools

Stationery

1. Nutrition Problems and Food Formulation Trials

The nutritional status and health of mothers and children is a determinant of the human quality. The thousand-day period which is 270 days during the pregnancy and 730 days during the first life of an infant, is sensitive as the consequences for the baby at this moment are permanent.

2. Physiological Conditions of Pregnant Women

“You are what your mother eats”

Consumption of a pregnant woman will provide long-term permanent effects, especially for her health and the baby. The development of the egg to a fetus occurs in a very short time in 9 months. Therefore, the 9 months critical period needs to be supported with adequate nutritional intake in terms of quality and quantity and given at the right time. So, the fetus's development can be achieved optimally (Brown, 2011).

During pregnancy, a woman experiences various anatomical and physiological changes as a mechanism to support fetal development. Almost all organs of a pregnant woman will experience changes starting from the beginning of conception (Soma-Pillay et al., 2016). Therefore, some physiological changes that will influence the nutritional needs of a pregnant woman are:

3. Hematological Changes

During pregnancy, there is an increase in blood plasma volume. Most of the increasing action occurs until the 34th week of pregnancy and the increasing size is proportional to the baby's weight. Increase in plasma volume has an influence on the decreasing concentration of hemoglobin, hematocrit, and red blood cells in the blood due to hemodilution (blood dilution due to increased plasma volume) (Soma-Pillay et al., 2016; Talbot and Maclellan, 2016). When the plasma volume

increase is not followed by erythropoiesis acceleration, this hemodilution action will be causing [anemia](#). Besides, hemodilution also affects [the decrease of albumin concentration](#) (Allen, 2012).

During pregnancy, the amount of hemoglobin will decrease but by observing the structure of the blood cells, normal change in blood morphology will not occur during pregnancy as the value of MCV and MCHC are indicated to be normal. A decrease in hemoglobin implicates an increase in the need for iron 2 to 3 times, in comparison to the need of a normal person. This increase not only aims to accommodate the process of forming new hemoglobin for the body of both the mother and fetus but also is required for the production of several enzymes. Apart from the need for iron, the [demand for folate also increases from 10 until 20 times, along with the need for vitamin B12 2 times](#) the need of a normal person (Soma Pillay et al., 2016).

a. Changes in Renal System

During pregnancy, the glomerular filtration rates (GFR) of a woman will increase. This is caused by a decrease in glomerular pressure due to an increase in plasma volume, which reduces the oncotic pressure due to decreased albumin concentration. In addition, the presence of renal vasodilatation causes the blood flow in the kidney runs high, so the GFR increases up to 50-85% (Soma-Pillay et al., 2016). This condition influences [the loss of glucose, amino acid, and water-soluble vitamins through the urine due to the increasing rate of renal excretion](#) (Allen, 2012).

Reabsorption of glucose in the proximate tube and collective duct also becomes ineffective when pregnant. 90% of pregnant women happen to have a daily average glucose excretion flow of up to 1-10 glucose/day. Permeability increase of the glomerular capillary affects the increase of albumin protein fractions until 300 mg/day (Soma Pillay et al., 2016).

b. Changes in Endocrine System

Production of several pregnancy-specific hormones such as relaxin, human placental lactogen (HPL), gonadotropins, and others affect several systems in the body. Excretion of hormone B-HCG stimulates the enhancement in the production of TSH. Increased synthesis of HPL can trigger gestational diabetes through the increase in insulin resistance. Besides HPL, insulin resistance is also affected by increased cortisol secretion. Gestational diabetes often results in overweight newborns (> 4kg) or often called macrosomia (Talbot and MacLennan, 2012).

[Iodine deficiency](#) is also often found in pregnant women as a result of high levels of iodine active transport from mother to fetus and an increase in iodine excretion through urine (Soma Pillay et al., 2016). Therefore, World Health Organization recommends increasing iodine intake during pregnancy to 250 µg/day (WHO, 2007), whereas the US Institute of Medicine recommends a daily intake of iodine at 220 µg/day (Institute of Medicine, 2001).

c. Changes in Nutrition Substance Metabolism

- Carbohydrate Metabolism

In early pregnancy, pancreatic β cells undergo hyperplasia and increase insulin secretion and sensitivity. These happen as attempts by the body to fulfill the needs of a growing fetus. However, as gestational age increases, [insulin resistance occurs progressively](#). Insulin resistance started in the second trimester of pregnancy and reaches its peak in the third trimester (Buttes, 2000).

Insulin resistance happens due to an increase in diabetogenic hormone secretion such as HPL, growth hormone, progesterone, cortisol, and prolactin. The presences of those hormones interrupt the signaling process of the insulin receptors, hence decreasing the insulin sensitivity in the periphery cell, such as adipose and skeletal cells (Soma Pillay et al., 2016).

During pregnancy, fasting and postprandial insulin levels will increase. On the other hand, the fasting blood sugar level will decrease as a result of an increase of glycogen storage in tissue, the use of peripheral glucose, and a decrease in glucose production by the liver, as well as glucose takeover by the fetus exists (Soma Pillay et al., 2016).

- Lipid Metabolism

Changes in lipid metabolism happen during pregnancy, which triggers lipid accumulation in early pregnancy (anabolic state). However, this trend will change with the increase in gestational age. In the last half phase of pregnancy, degradation (catabolism) happens along with the mobilization the adipose storage in the form of free fatty acid (Versen-Hoeynck and Power, 2007)

Total cholesterol and triglycerides tend to increase during pregnancy. An increase in triglyceride levels occurs as a result of estrogen stimulation, insulin resistance (Buttes, 2007), and an increase in HPL (Emet et al., 2013). Low-Density-Lipoprotein (LDL) level increases to 50% during labor. On the other side, High-Density-Lipoprotein (HDL) levels tend to increase in the early trimester of pregnancy and the trend will decrease in the last trimester of pregnancy. Nonetheless, the average HDL concentration of a pregnant woman will still be higher up to around 15% compared to the level in a normal person. Changes in the lipid fraction occur as pregnancy compensation, as triglycerides can be used as alternative energy besides glucose, LDL is needed for steroidogenesis (production of steroid hormones) of the fetus (Soma-Pillay et al., 2016).

- Protein Metabolism

Changes in protein metabolism during pregnancy are complex. By the end of pregnancy, nitrogen retention in a woman will decrease because of the excretion urine nitrogen is also decreasing. This condition shows a progressive increase in protein needs towards the end of gestation (King, 2000).

- Calcium Metabolism

The fetus needs around 30 g of calcium per day as raw material for the fetus's physiological process. Almost the needs of calcium from the fetus will be transferred from the mother to the fetus in the third trimester. This need is achieved through calcium absorption from the mother's diet.

By biochemistry, calcium serum in the blood of pregnant women tends to decrease. It is related to a decrease in albumin concentration in the mother's blood, whereas albumin is the main transporter of calcium. This action implicates a normal level of ionized calcium serum, however decreasing the albumin-calcium fraction. Therefore, pregnant women are at risk of having calcium stones disease(Soma-Pillay et al., 2016).

The need for calcium increases to two times from the age of 12 weeks of pregnancy. Although, the peak demands of calcium happen only in the third trimester (Soma Pillay et al., 2016). Increased needs for calcium are causing a higher risk of osteoporosis in women, especially for women aged 30 years and older where the bone mass production phase no longer occurs.

4. Physiological Condition of Lactating Mothers

Exclusive breastfeeding is the main resource for babies to get their intake till the first 6 months of their life. According to various studies, exclusive breastfeeding is stated to be beneficial for the mother and child (Table x):

Table x. Benefit exclusive breastfeeding for mother and child

Target	Benefits
Mother	<ol style="list-style-type: none"> 1. Preventing post-labor bleeding 2. Uterine involution 3. Reducing blood loss during menstruation 4. Giving birth distance to the child 5. Returning to normal weight (as before pregnancy) 6. Reducing the risk of breast and ovary cancer 7. Lowering the risk of hips bone fracture and post-menopausal osteoporosis
Child	<ol style="list-style-type: none"> 1. Reducing the risk of any disease/ meningitis bacteria infection, diarrhea, respiratory infection, bladder infection, sepsis, etc. 2. Reducing the risk of sudden death in baby 3. Reducing the risk of overweight and obesity 4. Increase the bond between mother and child

Growth of the mammary glands from menarche to pregnancy is happening to prepare for the breastfeeding period. Hormonal changes in women increase the breast size, areola, and nipple. Pregnancy hormones significantly increase the number of ducts and alveoli, thereby affecting the growth of the mammary gland. At the end pregnancy period, the lobule alveoli system develops maximum, as well as colostrum which is yellowish milk rich in antibodies and is produced from the time of the delivery until a few days after. After giving birth, there is a decrease in estrogen and progesterone level, along with an increase in prolactin secretion for the breastfeeding period.

The stimulus for milk production and secretion from the mammary glands (mother's breasts) is through suction from the baby. Subcutaneous nerves in the areola send signals to the hypothalamus through the spinal cord. Then the signal will reach the pituitary gland to stimulate the anterior and posterior regions of the brain. Prolactin from the anterior pituitary stimulates milk production in alveolar cells whereas oxytocin from the pituitary posterior stimulates myoepithelial cells to contract, causing movement of milk from ducts and sinuses to be transferred and finally consumed by the baby.

5. Nutritional Needs of Lactating Mothers

Breast milk production is influenced by breastfeeding frequency and the mother's hydration status. However, the composition of breast milk is affected by the mother's consumption pattern. Breast milk of nutrition-deprived mothers has lower nutrition quality, which reflects the quality of the mother's food consumption. As the quality of breast milk is influenced by the quality of the mother's consumption pattern, then the adequacy of maternal consumption must be fulfilled according to the physiological changes during the breastfeeding phase.

1. Energy

Production of milk is 80% efficient, production of 100 ml milk (around 75 kcal) requires 85 kcal output. During the first 6 months of breastfeeding, the average production of breastmilk is as big as 750 ml/day, with a range of 550-1200 ml/day. Breast milk production is affected by the frequency, duration, and intensity of breastfeeding. Then if breast milk is consumed more sufficiently and frequently, it will stimulate more production.

Energy requirements for breastfeeding based on AKG are more than 300 kcal during the first 6 months and 400 kcal during the next 6 months (Permenkes No. 75 of 2013). Reserved maternal fat that accumulates during pregnancy can contribute 100-150 kcal of energy to support the early period of breastfeeding, but henceforth sufficient maternal energy intake is needed. In the second 6 months of breastfeeding breastmilk production reduces to an average of 600 ml/day, therefore it is needed to support by additional energy from the companion food (MP-ASI). Breastmilk production reduces when the mother follows a strict diet (< 1500 kcal/day) (Lawrence and Lawrence 2005). Thus, A mother needs to take note of her source energy intake, so that she can produce her breastmilk optimally.

2. Proteins

AKG recommends adding 20 g proteins/day to a lactating mother either in her first or second semester of breastfeeding. The average needs of a lactating mother are estimated from the number of proteins in daily produced breast milk, of which 70% is converted into a source of protein intake for the child. Mother's protein intake is also really needed after giving birth through surgery to speed up the healing process.

3. Carbohydrates

AKG recommends an additional 45 g carbohydrates/day for a lactating mother in her first 6 months of breastfeeding and 55 g carbohydrates/day for the second 6 months period of a lactating mother. Needs for carbohydrates is considered by the adequate calories of breastmilk, the need to avoid the risk of ketonemia, and to maintain the mother's blood glucose stability during breastfeeding.

4. Fat

AKG's recommendation for fat is to add 11 g fat/day for the lactating mother in the first 6 months and 13 g fat/day in the second 6 months of the breastfeeding period. Limited energy consumption will affect the distribution of reserved body fat of the mother and also indirectly influence the fat and fatty acid composition in breast milk. Besides total fat, AKG also recommends adding 0.2 g/day of linolenic acid (n-3) as well as 2 g/day of acid linoleic (n-6).

5. Vitamin and Mineral

Vitamin D content in breast milk is related to maternal consumption of vitamin D and sun exposure. Lactating mothers with lactose intolerance/not consuming milk, and not consuming vitamin D from food and supplements are at risk of having vitamin D deficiency. The adequacy of vitamin D during breastfeeding is 5 mcg/day (IOM 1997).

Calcium level in mothers is not related to maternal intake. The adequate amount of calcium during breastfeeding is 1300 mg/day (age under 19 years) and 1000 mg/day (age 19-50 years). Iodine and zinc requirements for lactating women are higher than for pregnant women. Within the breastfeeding process, zinc content in breast milk decreased from 2-3 mg/day to 1 mg/day for up to 3 months. The adequacy of zinc during breastfeeding is 12-14 mg/day (IOM 2001).

6. Lactogogum

Lactogogum is a substance that can increase and initiate breast milk production.

6. Physiological Conditions of Infant Growth and Development

1. Physiological Condition of Baby's Weight

For the babies who were born at full term, their weight will return to the birth weight on day 10. It becomes 2x their birth weight when the baby is five months old, becomes 3x birth weight at one year old, and becomes 4x birth weight at two years old.

Weight gain in the first year of life, if the child gets sufficient nutrition:

a. 700 – 1000 g/month at I quarter

b. 500 – 600 g/month at II quarter

c. 350 – 450 g/month at III quarter

d. 250 – 350 g/month at IV quarter

2. Physiological Condition of Baby's Height

The average birth height is 50 cm. Overall, the child's height can be estimated as the following:

a. 1 year → 1.5x Birth Height

b. 4 years → 2x Birth Height

c. 6 years → 1.5 One-Month-Old Height

3. Development Digestive System

Babies take up to 6 months for their digestive tract to mature. Therefore, babies can only consume breast milk at the age of 0-6 months. The baby's stomach capacity increases from 10-20 ml at birth to 200-300 ml at 12 months old. The intestine has been functioning since birth, yet the peristalsis movement matures throughout the process of getting older.

4. Food Digestion

a. Carbohydrates

At the age of 4-7 months, babies begin to grow their incisors. Babies need an adaptation process to digest starch and so this process can last for a few days or weeks. Therefore, babies often experience some sort of digestion problem called diarrhea.

b. Proteins

Infants generally have difficulty digesting casein protein. Over-excessive protein intake should be avoided, especially in premature babies and younger babies. As it is caused the kidney to load on the fluid concentration (renal solute load) in a very excessive way and induces the disturbance of acid-base balance along with metabolic acidosis.

c. Fat

In newborns, the function of the pancreas and liver are not fully developed especially in premature babies.

d. Excretory System

At birth, a baby has immature kidneys and the kidney nephrons are just perfect when the baby is one month old.

7. Physiological Condition of Infant Growth And Development

1. Height and Weight Growth

During the second year of life, the baby gains weight of about 0.23 kgs/month. The average length grows 50% (75 cm) longer at the end of the first year and becomes 2x at the end of the fourth year of life.

2. Sensory Development

At the age of five, the five senses of children are expected to function optimally. In line with the development of intelligence and the number of words they perceive, preschool-age children can speak simple complete sentences.

3. Teeth Growth

The formation of a healthy and perfect teeth structure is feasible through quality nutrition with adequate protein, calcium, phosphate, and vitamins (especially vitamin C and vitamin D). At age 16 – 18 months, canines are starting to appear.

8. Nature and Characteristics of Nutrients

1. Vitamin A

Vitamin A is a fat-soluble vitamin. In food, vitamin A is often found in the form of retinyl ester, which is bound to the long-chain fatty acid. In the body, vitamin A functions in the form of active chemical bonds namely, retinol (alcoholic form); retinal (aldehyde), and retinoic acid (the acid form). **Vitamin A is resistant to heat, light, and alkalis, but not to acid and oxidation.** The common cooking methods do not lose much vitamin A. High temperatures used in the frying method can destroy vitamin A, as well as the oxidation that occurs in rancid oil. The active form of vitamin A can only be found in animal-source foods. **Foods derived from plants** contain carotenoids and **provitamin A**. The carotenoids that can be used as provitamin A are the alpha, beta, and gamma forms along with cryptoxanthin. Beta-carotene is the most active form of provitamin A, which consists of two retinol molecules bond.

Vitamin A is essential for normal reproduction and embryo development. As both vitamin A deficiency and overdoses have teratogenic effects, special care needs to be taken to ensure adequate intake during pregnancy ((1000 – 2500 UI/ day), especially at the TM II and TM III). A pregnant woman who is not at risk of vitamin A deficiency is suggested to limit the consumption of no more than 2600 UI/day as a supplement (3000 µg = 10,000 UI)

Unique interactions with other nutrients such as iron–vitamin A can boost the usage of iron in hematopoiesis. Vitamin A deficiency can cause a disturbance in iron absorption and lessen its use

in erythropoiesis. [The other nutrient, zink](#) also plays a role in which its deficiency can influence the mobilization of vitamin A in the liver storage and absorption of vitamin A in the intestines.

2. Vitamin C

[Vitamin C is a vitamin that can be easily damaged through contact with air \(oxidation\) specifically when exposed to heat.](#) Vitamin C is not stable in alkaline and stable in acidic conditions. When consumed in excessive amounts from the requirements, the remaining vitamin C will be excreted from the body without any changes. Excess amounts of vitamin C up to more than 500 mg will be stored in the form of oxalate. Oxalic acid accumulation in the kidneys can turn into kidney stones.

Food can lose vitamin C from the time it is harvested up until served on the table. Several conditions that can eliminate vitamin C are: when it is stored for too long at a hot temperature, exposed to direct air for a long time (oxidized), washed, immersed in water, cooked at high temperature for a long time, cooked in a cast-iron or copper pot, let it sit for a long time after cooking at room temperature or hot temperature before eating.

3. Folate

Folate or folic acid or folacin or pteroyl mono glutamate is the generic name of a group of bonds that are chemically and nutritionally similar to folic acid. Folic acid can be useful to heal the numerous macrocytic anemia that exists in poor communities. In the free acid form, folic acid is insoluble in cold water, yet it is more soluble in sodium salt. In food, it is mostly found in the reduced form which is labile and more likely to perform a reduction reaction. Around 50 – 95%, folate can be lost due to cooking and food processing. Folic acid in vegetables is most likely to lose when it is stored in a room. Folic acid plays a role in the synthesis of purines—guanine and adenine as well as thymine (pyrimidine) within the formation of DNA and RNAs.

Folate is found widely in foods, specifically in greens, liver, lean meat, whole grains, seeds, nuts, and oranges. Vitamin C in oranges can inhibit folate breakdown. Most foods contain a small amount of folate, including milk, eggs, tubers, and fruit except oranges.

Since folate is easily destroyed by heat, hence it is recommended to eat raw fruit and vegetables or halfway-cooked vegetables. Folic acid can be limited by the presence of inhibitors in the form of folate hydrolase enzymes and other factors. It is estimated that only 50% of folate from food can be absorbed.

4. Vitamin B12

Vitamin B12 or cobalamin is present in just small amounts both in food and body tissue. Vitamin B12 is slowly destroyed by dilute acids, alkaline, and light, as well as oxidizing and reducing agents. When the cooking process occurs, approximately 70% vitamin B12 can be maintained.

All natural vitamin B12 is obtained as a result of bacterial, fungal, or algae synthesis. The main source is animal-derived protein from the synthesis of intestine bacteria such as liver, kidney, milk, eggs, fish, cheese, and meat.

Table 1.1. Stability of Nutrients^a

Nutrient	Effect of pH			Air or oxygen	Light	Heat	Maximum cooking losses (%)
	Neutral pH 7	Acid <pH 7	Alkaline >pH 7				
Vitamins							
Vitamin A	S	U	S	U	U	U	40
Ascorbic acid (C)	U	S	U	U	U	U	100
Biotin	S	S	S	S	S	U	60
Carotene (pro-A)	S	U	S	U	U	U	30
Choline	S	S	S	U	S	S	5
Cobalamin (B ₁₂)	S	S	S	U	U	S	10
Vitamin D	S		U	U	U	U	40
Folic acid	U	U	S	U	U	U	100
Inositol	S	S	S	S	S	U	95
Vitamin K	S	U	U	S	U	S	5
Niacin (PP)	S	S	S	S	S	S	75
Pantothenic acid	S	U	U	S	S	U	50
<i>p</i> -Aminobenzoic acid	S	S	S	U	S	S	5
Pyridoxine (B ₆)	S	S	S	S	U	U	40
Riboflavin (B ₂)	S	S	U	S	U	U	75
Thiamin (B ₁)	U	S	U	U	S	U	80
Tocopheral (E)	S	S	S	U	U	U	55
Essential amino acids							
Isoleucine	S	S	S	S	S	S	10
Leucine	S	S	S	S	S	S	10
Lysine	S	S	S	S	S	U	40
Methionine	S	S	S	S	S	S	10
Phenylalanine	S	S	S	S	S	S	5
Threonine	S	U	U	S	S	U	20
Tryptophan	S	U	S	S	U	S	15
Valine	S	S	S	S	S	S	10
Essential fatty acids	S	S	U	U	U	S	10
Mineral salts	S	S	S	S	S	S	3

^a S, stable (no important destruction); U, unstable (significant destruction).

Source: Nutritional Evaluation of Food Processing 3rd edition

Assignment:

- Discuss with your group the steps you are needed to plan a food trial experiment
- Practice the food trial experiment with your group
- Report your group work and the experiment results

II. FOOD TRIALS (PRODUCT DEVELOPMENT)

1. SETTING THE OBJECTIVES

Practicum Objectives

Students can set the purposes of food product development by considering the mission, target groups, and the product's characteristics

Teaching Methods

Practice/group discussion in the class

Material and Tools

Stationery

The Objective of Product Development

By the principle, a person or a group of people is free to express any different kinds of ideas, including ideas for food product development. However, to get the ideas more directed and easier to perceive, it needs to be limited to such a vivid and firm number.

So, to narrow down the purposes, these are a few questions that you are needed to answer:

1. Is the product development that will be carried out solely aimed at getting maximum profit (profit-oriented) or is there another mission (non-profits), for example, to support the community nutrition programs?

2. Who is the targeted market for the developing food product? For example, pregnant women, lactating women, infants, or toddlers?

Notes:

Infant: < 1 th

Toddler: 1-5 years

Teenager: 12-19 yrs

Adult: 19-60 th

3. Which type of product will you develop, is it an innovative product, a modificative product, or an imitative product?

An innovative product is a brand-new product, that has never existed in the past and is unknown in the market.

A modificative product is a result of quality refinement of the existing product.

Assignment I

1. Define the purpose of your food product development through group discussion with the help of the following steps:
2. Set the missions of the food product development and give a brief reason why your group chooses the missions
3. Define the target market of the food product and write the reasons why your group chooses this group of people
4. Specify the characteristics of your food product and write brief information about why your group chooses to make this type of product (innovative, modificative, imitative)

Notes: Take a look at the theory in Chapter II: The Principles of Food Experiment

2. FORMULATING THE PROBLEMS

Practicum Objectives

- Students can identify and formulate food-nutritional problems in the targeted group of food product development.
- Students can identify the potential for formulating solutions to nutritional problems by designing food products for targeted groups with a scientific approach (nutrition, acceptability, and resources: tools, energy, time, costs, etc.)

Teaching Methods

Practice/group discussion in the class

Material and Tools

Stationery

Food database/Daftar Komposisi Bahan Makanan (DKBM)

Calculator

Food Recipes

Nutrition Problem in Indonesia

In the efforts to improve the nutrition quality in the community, it is needed to at least consider 2 (two) main things, namely: “What are the nutritional problems?” and secondly “Who is suffering from those problems in the community?”

In the process of defining the nutrition problems, there are 3 (three) criteria to be considered, including the problem’s area (prevalence), impact, and technology for the intervention. The first 1000 days of life/1000 HPK period is a very crucial stage to provide a quality human.

Nutritional problems which often appear in this group of age are no other than nutritional deficiencies, both macronutrients and micronutrients. As a result, the child’s growth when it’s still a fetus and already born is not optimum. Nutrition deficiencies in pregnant and lactating women do not only harm the children but also the mothers. Specific nutritional needs are based on the physiological conditions of each age group.

Example: Physiologically, a pregnant woman will experience hemodilution (an increase in blood volume) in trimester I–II. This condition needs to be balanced with an adequate amount of proteins and supported by consuming vitamin C to increase iron (Fe) absorption.

These nutrition problems can be overcome by consuming quality food (appropriate/balanced). Thus the provision of quality food products that accordance with the needs of the target market, has become a demand and need for the community.

Aspects To Be Considered

In addition to paying attention to certain nutrients (according to each nutritional problem), planning a food product that aims to solve community nutrition problem also consider other aspects such as availability of the raw material raw, the cooking process, sensory characteristics,

food safety, shelf life, presentation, and costs. All aspects need to be noticed so that the product will be developed not only to the extent of the product concept (a dream product), yet can come true for the purpose and expectation of the product.

Assignment II

1. Set the formula problem, with the following steps:
 - a. Set a target group and describe the characteristics
 - b. After learning through literature or other sources along with hearing through academic or field (informant) experiences, then discuss it with your group to identify nutritional problems of the targeted group
 - c. Write brief statements about the nutritional problems of the targeted group
2. Identify the necessary aspects to be considered in designing food products for the targeted group, with the help of the following steps:
 - a. Identify the types of food and beverage that are consumed by the targeted group target, including the popular products which take special attention (3 products).
 - b. Take your pick between the food and beverage product options for the target consumer by considering the criteria (identify 1 food product and 1 beverage product) (?, dokumen terpotong)

Notes:

1. Prepare standard recipes for the selected food and beverage
 - Recipe's name
 - Portion
 - Ingredients
 - Cooking method/process (descriptions and flow chart)
2. Try to make a framework for thinking about the developed product concept (flowchart)
3. Think about the concept of product formulation

3. FORMULATING THE PRODUCT CONCEPT

Practicum Objectives

Students are able to formulate the concept of food products by considering the needs, demands, and desires of the targeted groups.

Teaching Methods

Practice/group discussion in the class

Material and Tools

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The result of problem observation and identification

Product Concept

A new idea can come from various parties. Brilliant ideas can be raised through observation and identification of problems. The detailed output from the generating process of an idea that will be embodied in a new product can be called a product concept.

Product concept generally covers the details which include:

1. General description of the idea of a product

A detailed description of the overview of the initiated product

Example: " A type of rough flour for the baby's food which is ready to be eaten by adding warm water, it is stated to meet the nutritional needs, taste delicious, can be stored for a long time at room temperature, and its package is easy to open. With the price of no more than IDR 3,000 per pack. "

2. Product positioning on the market

Explanation of how the product exists among other products in the market as if to be a competitive, complementary, or substitute product?

3. Target consumer

The product consumer can be reviewed from various aspects: age group (infant, toddler, etc); social economy (intermediate to on, etc), etc.

4. Technology support

Description of the needs and availability of technology as well as the equipment.

5. Product Superiority

Description containing the advantages of the product's characteristics (nutritional value, delicacy, uniqueness (social culture aspect, natural aspect, etc)) compared to other products present in the market.

6. Product Packaging

Illustration of the product packaging concept or packaging ideas to preserve the product and to have an attractive point (design: material, shape, etc, along with added value: practicality and convenience).

7. How to use the product

Description of how to utilize (process, store, etc) so that optimum properties/results can be obtained from the product.

8. Product name

Symbol of a meaning (example: quality of product).

Both the designated name and meaning should have an appropriate correlation. Naming also can affect the product. Hence, the product name should be easy to remember and attractive following the main characteristics and goals of the product.

Assignment III

Make detailed information about the product concept that will be developed which includes the following elements:

1. General description of the idea of a product
2. Product positioning on the market
3. Target consumer
4. Technology support
5. Product Superiority
6. Product Packaging
7. How to use the product
8. Product name

4. DESIGNING THE EXPERIMENT

Practicum Objectives

Students are able to design experiments for food product development by doing a scientific approach and using the scientific method.

Teaching Methods

Practice/group discussion in the class

Material and Tools

Stationery

The result of problem observation and identification

The result of product concept formulation

Experimental Design

If the product concept has been formulated then to make it happen, it needs to be tested. To obtain matching results to the purposes and expectations of the experiment, it is necessary to have a well-planned experimental design. Some things which are needed to prepare include:

1. Set population material that will be used
2. Draft the Experiment
3. Treatment plans/factors that will be used
4. Methods to observe the experiment response
5. Methods to control any sources of diversity
6. Formulate the hypothesis

Assignment IV

Plan an experiment design of product development with the following steps:

1. Define the experiment design
 - Research type
 - Experimental design
2. Define research implementation design
 - Preliminary research (objectives, operational design of the experiment)
 - Follow-up research (processing and assessment)
3. Determine the samples and panelists of the research
 - Samples (aspects which are needed to consider)
 - Panelists (who and how many)
4. Define the quality assessment technique (acceptance test) and observation
5. Define the data collection technique and the instrument
6. Determine the technical data analysis (hypothesis if any)

5. PRACTICING FOOD EXPERIMENT

Practicum Objectives

Students can conduct food and beverage product development experiments with a scientific approach and use the scientific method.

Teaching Methods

Practice/group discussion in the class

Material and Tools

Stationery

Ingredients

Cooking utensils

Packaging equipment

Organoleptic test form

Formula Development Experiment Practice

Formula development practice is an experimental study to work in the laboratory. After developing the formula, there will be an organoleptic test that involves the five senses. One of the most common organoleptic tests is a hedonic test.

The hedonic test or preference test is a type of acceptance test. In this test, panelists are requested to disclose the personal responses (likes/dislikes) of the samples. The preference scale that is used for the test is called as hedonic scale.

Assignment

Conduct product development experiments (food and beverage) with the following steps:

1. Create the concept of a food product
2. Plan the experimental design
3. Create the basic formula (F0) and developed formula, then make the operational outline by using the processing flowchart
4. Make an inventory of the needed ingredients
5. Write down the needed equipment
6. Defining the criteria and amount of the organoleptic test panelists
7. Make a work plan with the team
8. Perform the processing practices based on the flowchart
9. Do a presentation of one recipe in a complete meal
10. Count and serve the dishes per portion
11. Do a presentation on the results of product development works of your team
12. Perform the organoleptic test
13. Record, collect, and organize the data of the organoleptic test

6. DATA PROCESSING AND ANALYSIS OF EXPERIMENT RESULTS

Practicum Objectives

Students can process and analyze data which obtain from the food and beverage products development experiment.

Teaching Methods

Group practice in the computer laboratory

Material and Tools

Stationery

The data from the organoleptic test (hedonic test)

Computer set

Data Processing and Analysis

Data processing and analysis of the experiment result can be done with 2 method which is descriptive analysis and analytical analysis. Descriptive analysis is done to know the acceptability of the product by generating its range, average, and mode of the results to each sensory property (color, taste, aroma, texture, shape, etc.). While analytical analysis is carried out to determine the difference in the level of preference for the product characteristics. Among the choice of statistical tests, the Friedman test can be used. Whereas Wilcoxon signed rank test is used to identify the differences.

Assignment

Perform data processing and analysis from the results of your experiment with the following steps:

1. Check the completeness of the obtained data
2. Create a data entry set in the SPSS software.
3. Input the data result of the experiment (both food and beverages experiment)
4. Analyze the data with SPSS software
5. Learn the printout result of both descriptive and analytical analysis
6. Prove there is/no influence with the change of food formula
7. Prove there is/no difference in preference of sensory properties of the food
8. Reveal the different pair of formulas based on each sensory characteristics

7. ARRANGING THE REPORT

Practicum Objectives

Students are able to arrange the reports of product development experiments by using the principles of scientific writing.

Teaching Methods

Group discussion and assignment

Material and Tools

Stationery

The result from experiments I and II

Report Arrangement

Research (experiment) has been carried out, from the first step: finding and identifying the problem to the final step: concluding the results of the study. Therefore, a researcher needs to write down everything about the works and results in a report or scientific paper.

Every scientific report or paper has its framework certain and can be easily understood. In short, the framework scientific study report or paper consists of parts as follows:

1. Title
2. Researcher's names
3. Institution address
4. Summary
5. Introduction
6. Materials and methods
7. Results
8. Discussion, including the conclusion
9. Acknowledgment
10. References

Those 10 points must be well written.

Short Explanation

Title

A title should be made in such an exact, correct, logical, and thorough way so that can deliver the idea of the research.

Researcher's names

- The written researcher's names are those who truly work and think about the issue from the beginning until the final writing of the study results.
- Sorted by the role.

Institution address

Write down the name of the institution where the writers study

Summary

- The written summary must be accurate and appropriate to the conducted study.
- A summary must be made in such a form so that it can be communicative and contain facts as well as the data which is truly obtained from the results of the research.

Introduction

- It should contain the issue's background, which is taken from reading materials or other information sources.
- Introduction is written in a systematic and informative way with simple yet precise and correct language.
- The use of information from other research must be quoted correctly, accurately, and fairly.

Material and methods

- It should be explained and included all processes along with procedures of a study in a correct, appropriate, and honest manner.
- The drafting of materials and methods should be systematic and easy to understand.

Results

- Results made in such form, so the readers can easily understand
- The displayed facts are the results of research, those are neither imagination nor the results of other people's research
- Results in the form of data are more likely to illustrate in a table, chart, picture, etc which is easier to understand
- Statistics must be used correctly and appropriately, and must not be used for manipulating the data to be more meaningful

References

- It is necessary to include all used literature (study, books, etc)
- There is no need to write reading materials that are not used at all
- It is needed to avoid errors in quoting a person's name in the main script or references
- All related matters to the study and several issues need to be discussed properly and objective
- In terms of writing, a "passive" sentence is generally used not the "active" sentence one

Discussion (including conclusion)

Acknowledgment

It is given to all parties who are entitled to accept (help and support the study).

Assignment VII

Make a scientific study report from the experiment results test with the following steps:

1. Title

Author(s) name (your group member)

Institution address (where you study)

→ Cover and first page (white)

2. Foreword

Graceful and thankful expression

3. CHAPTER I: Introduction

a. Background

b. Identification of The Problem

c. Formulation of The Problem

d. Formulation of The Product's Concept

4. CHAPTER II: Objective and Benefit

a. General Objective and Specific Objective

b. Benefit (to The Researcher, Institution, Society)

5. CHAPTER III: Conceptual Framework

6. CHAPTER IV: Research Methodology

A. Study Design (Type and Experimental Plan)

B. Location and Time of The Research

C. Materials and Tools

D. Operational Framework (Working Procedure)

E. Sample and Panelists

F. Data Collection Method

G. Data Processing and Analysis Method

7. CHAPTER V: Results and Discussion

A. Product Characteristics (Based on The Observation)

B. Acceptability

C. Nutritional Value

D. Nutritional Economic Value

8. CHAPTER VI: Conclusion and Recommendation

9. References

Attachment (baseline data, analysis results, photos, etc)

8. BUSINESS PLAN

Practicum Objectives

Students are able to compile business proposals for food and beverage products that have been produced in the experiments.

Teaching Methods

Group practice in the class

Material and Tools

Stationery

Report of the experiment

Computer Set

Business Plan

To achieve a successful business, accuracy in planning own a big role and so the efforts of working on it are not a "nekad" (stubborn) action. Thus, it is needed to make a business plan. Some crucial points to be presented in a business plan proposal, for instance :

1. General Description Of The Business

2. Market Analysis:

2.1. Defined Target Market

2.2. Trend of Similar Product/Business

2.3. The Situation of The Similar Business/Product Rivalry

3. Marketing Plan

3.1. Marketing Strategy

3.2. Cost Determination

3.3. Promotion

4. Business Aspects

4.1. Location

4.2. Facilities and Equipment

4.3. Human Resources

5. Financial Aspect

5.1. Funding Sources

5.2. Cost Of Goods Sold (Cogs)

5.3. Budget Planning

5.4. Feasibility Analysis

6. Management Aspect

6.1. Name of The Business

6.2. Business Legality

6.3. Organization

Assignment III

- Arrange a business proposal from your group's experiment results
- Choose one product, either a food or beverage product that, according to your group's intuition, is worthy of being developed as a business.
- Good luck

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ATTACHMENTS

- 1. SNI : 01-7148-2005 (Special Beverage for Pregnant and Lactating Women)**
- 2. SNI : 01-7111.1-2005 (MP-ASI : Instant Porridge)**
- 3. SNI : 01-7111.2-2005 (MP-ASI: Biscuits)**
- 4. Organoleptic Test Form**

1. SNI : 01-7148-2005 (Special Beverages for Pregnant and Lactating Women)

Table 1 Macronutrients and ash contents in special beverages for pregnant women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Energy	Kcal	Min. 370	Min. 65
2.	Protein	g	18-25	3.2-4,4
3.	Fat	g	Min. 3.5	Min. 0.6
4.	Carbohydrate	g	Max. 65	Max. 11.4
5.	Water	g	Max. 4	-
6.	Ash	g	Max. 6	Max. 1.1

Table 2 Mandatory vitamins in special beverages for pregnant women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Vitamin A	mcg/RE	300-500	53-88
2.	Vitamin B1 (Thiamine)	mg	0.5-1.0	0.1-0.2
3.	Vitamin B2 (Riboflavin)	mg	0.5-1.1	0.1-0.2
4.	Vitamin B3 (Niacin)	mg	6-14	1.1-2.5
5.	Vitamin B6 (Pyridoxine)	mg	0.6-1.3	0.1-0.2
6.	Vitamin B9 (Folic Acid)	mcg	285-400	49-70
7.	Vitamin B12	mcg	0.3-2.4	0.1-0.4
8.	Vitamin C	mg	14-75	2.5-13.2

Table 3 Mandatory minerals in special beverages for pregnant women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Calcium (Ca)	mg	200-800	35-140
2.	Iron (Fe)	mg	Min. 10	Min. 1.8
3.	Zinc (Zn)	mg	Min. 5	Min. 0.9

4.2.2.4 Other minerals can be added. Special minerals such as Magnesium (Mg), Manganese (Mn), Iodine (I), Selenium (Se), and Fluorine (F) need to follow the requirements (Table 4)

Table 4 Additional minerals in special beverages for pregnant women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Magnesium (Mg)	mg	40-240	7.0-42
2.	Manganese (Mn)	mg	0.3-1.8	0.1-0.3
3.	Iodine (I)	mcg	70-150	12-26
4.	Selenium (Se)	mcg	7-30	1.2-5.3
5.	Fluorine (F)	mg	0.3-2.5	0.1-0.4

Table 5 Macronutrients and ash contents in special beverages for lactating women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Energy	Kcal	Min. 400	Min. 70
2.	Protein	g	20-34	3.5-6
3.	Fat	g	Min. 7	Min. 1.2
4.	Carbohydrate	g	Max. 65	Max. 11.4
5.	Water	g	Max. 4	-
6.	Ash	g	Max. 6	Max. 1.1

Table 6 Mandatory vitamins in special beverages for lactating women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Vitamin A	mcg/RE	300-500	53-88
2.	Vitamin B1 (Thiamine)	mg	0.3-1.0	0.1-0.2
3.	Vitamin B2 (Riboflavin)	mg	0.4-1.1	0.1-0.2
4.	Vitamin B3 (Niacin)	mg	3-14	0.5-2.5
5.	Vitamin B6 (Pyridoxine)	mg	0.5-1.3	0.1-0.2
6.	Vitamin B9 (Folic Acid)	mcg	100-400	18-70
7.	Vitamin B12	mcg	0.4-2.4	0.1-0.4
8.	Vitamin C	mg	45-75	8-13

Table 7 Mandatory minerals in special beverages for lactating women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Calcium (Ca)	mg	150-800	26.25-140
2.	Iron (Fe)	mg	Min. 6	Min. 1.05
3.	Zinc (Zn)	mg	Min. 4.6	Min. 0.8

Table 8 Additional minerals in special beverages for lactating women

No.	Criteria	Unit	Requirements	
			Powder products (per 100 g)	Liquid products (per 100 ml)
1.	Magnesium (Mg)	mg	50-240	9-42
2.	Manganese (Mn)	mg	0.8-1.8	0.14-0.32
3.	Iodine (I)	mcg	50-150	8.75-26.25
4.	Selenium (Se)	mcg	5-30	0.88-5.25
5.	Fluorine (F)	mg	0.2-2.5	0.04-0.44

Table 9 Food additives requirements in special beverages for pregnant and lactating women

No	Kriteria	Satuan	Persyaratan	
			Produk berbentuk bubuk	Produk berbentuk cair
1	Pengawet		negatif	negatif
2	Pemanis buatan		negatif	negatif
3	Anti oksidan			
	a. Konsentrat campuran tokoferol	mg	Maks. 300 mg/kg lemak, tunggal atau campuran	Maks. 300 mg/kg lemak, tunggal atau campuran
	b. Alfa-tokoferol	mg		
	c. L-askorbil palmitat	mg	Maks. 200 mg/kg lemak	Maks. 200 mg/kg lemak
5	Pengemulsi, pemantap, pengental			
	a. Lesitin	g	Maks. 1,5 (dalam basis berat kering)	
b. Mono dan digliserida				
6	Pewarna			
	a. Biru berlian	mg	100 mg/kg, tunggal atau campuran	100 mg/kg, tunggal atau campuran
	b. Hijau FCF			
	c. Coklat HT			
	d. Hijau S	mg	300 mg/kg, tunggal atau campuran dengan pewarna lain	70 mg/l produk siap konsumsi
	e. Karmoisin			
	f. Kuning FCF			
	g. Merah Alura			
	h. Ponceau 4R			
	i. Tatzazin	mg	300 mg/kg, tunggal atau campuran dengan pewarna lain	
	j. Eritrosin			
k. Indigotin				
l. Kuning kuinolin				
7	Perisa /flavouring			
	Perisa yang diizinkan		Sesuai dengan ketentuan yang berlaku	Sesuai dengan ketentuan yang berlaku

2. SNI : 01-7111.1-2005 (MP-ASI : Instant Porridge)

No	Quality Requirement	Amount
1.	Water content	< 4 grams/100 grams
2.	Ash content	< 3.5 grams/100 grams
3.	Density energy	> 0.8 kcal/grams
4.	Protein	8 – 22 grams/100 grams
5.	Carbohydrate	< 7.5 gr/100 kcal or 30 gr/100 gr
	Fructose	< 3.75 gr/100 kcal or 15 gr/100 gr
6.	Dietary fiber	< 1.25 gr/100 kcal or 5 gr/100 gr
7.	Fat	> 1.5 gr/100 kcal or 6 gr/100 gr and < 3.75 gr/100 kcal or 15 gr/100 gr
8.	Must-have vitamins:	
	Vitamin A	> 62.5 RE/100 kcal or 250 RE/100 gr and < 180 RE/100 kcal or 700 RE/100 gr
	Vitamin D	> 0.75 µg/100 kcal or 3 µg/100 gr and < 2.5 µg/100 kcal or 10 µg/100 gr
	Vitamin C	> 6.25 mg/100 kcal or 27 mg/100 gr
	Possible additional vitamins:	
	Vitamin E	> 1 mg/100 kcal or 4 mg/100 gr
	Vitamin K	> 2.5 µg/100 kcal or 10 µg/100 gr
	Vitamin B1	> 0.1 mg/100 kcal or 0.4 mg/100 gr
	Vitamin B2	> 0.1 mg/100 kcal or 0.4 mg/100 gr
	Vitamin B3	> 1 mg/100 kcal or 4 mg/100 gr
	Vitamin B12	> 0.075 µg/100 kcal or 0.3µg/100 gr
	Folate	> 0.625 µg/100 kcal or 27µg/100 gr
	B6	> 0,2 mg/100 kcal or 0,7 mg/100 gr
	B5	> 0,3 mg/100 kcal or 1,3 mg/100 gr

9.	Mineral Sodium Calcium Iron Zinc (Zn) Iodine (I) Selenium (Se) and other minerals	100 mg/100 kcal for infant < 200 mg/100 kcal for 12 months and older > 50 mg/100 kcal or 200 mg/100 gr > 1.25 mg/100 kcal or 5 mg/100 gr with > 5% bioavailability >0.6 mg/100 kcal or 2.5 mg/100 gr >1.25 µg/100 kcal or 45 µg/100 gr >2.5 µg/100 kcal or 10 µg/100 gr
10.	Food Additives	
	Emulsifiers (lecithin, mono, and diglyceride) Acidity regulator (sodium hydrogen carbonate, potassium hydrogen, calcium carbonate) Acidity regulator (lactic acid) Acidity regulator (citric acid) Flavor Enhancer: Natural ingredients extract Ethyl vanillin and vanillin Nature identical flavor compounds Raising agent	< 1.5 gr/100 gr dry weight Moderate amount with limitation < 1.5 gr/100 gr < 2.5 gr/100 gr Moderate < 7 mg/100 gr Moderate Moderate

3. SNI : 01-7111.2-2005 (MP-ASI: Biscuits)

No	Quality Requirement	Amount
1.	Water content	< 5 grams/100 grams
2.	Ash content	< 3.5 grams/100 grams
3.	Density energy	> 4 kcal / gram
4.	Protein	1.5 – 6 grams/100 grams
5.	Carbohydrate	< 7.5 gr/100 kcal or 30 gr/100 gr
	Fructose	< 3.75 gr/100 kcal or 15 gr/100 gr
6.	Food fiber	< 1.25 gr/100 kcal or 5 gr/100 gr
7.	Fat	> 1.5 gr/100 kcal or 6 gr/100 gr and < 4.5 gr/100 kcal or 18 gr/100 gr
8.	Must-have vitamins: Vitamin A	> 62.5 RE/100 kcal or 250 RE/100 gr and < 180 RE/100 kcal or 700 RE/100 gr
	Vitamin D	> 0.75 µg/100 kcal or 3 µg/100 gr and < 2.5 µg/100 kcal or 10 µg/100 gr
	Possible additional vitamins: Vitamin E	> 1 mg/100 kcal or 4 mg/100 gr
	Vitamin K	> 2.5 µg/100 kcal or 10 µg/100 gr
9.	Mineral Sodium	100 mg/100 kcal for infant < 200 mg/100 kcal for 12 months and older
	Calcium	> 50 mg/100 kcal or 200 mg/100 gr
	Iron	> 1.25 mg/100 kcal or 5 mg/100 gr with > 5% bioavailability
	Zinc (Zn)	>0.6 mg/100 kcal or 2.5 mg/100 gr
	Selenium (Se) and other minerals	>2.5 µg/100 kcal or 10 µg/100 gr

10.	<p>Food Additives</p> <p>Emulsifiers (lecithin, mono, and diglyceride)</p> <p>Acidity regulator (sodium hydrogen carbonate, potassium hydrogen, calcium carbonate)</p> <p>Acidity regulator (lactic acid)</p> <p>Acidity regulator (citric acid)</p> <p>Flavor Enhancer: Natural ingredients extract</p> <p>Ethyl vanillin and vanillin</p> <p>Nature identical flavor compounds</p> <p>Raising agent</p>	<p>< 1.5 gr/100 gr dry weight</p> <p>Moderate amount with limitation</p> <p>< 1.5 gr/100 gr</p> <p>< 2.5 gr/100 gr</p> <p>Moderate</p> <p>< 7 mg/100 gr</p> <p>Moderate</p> <p>Moderate</p>
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Organoleptic Test Form with Hedonic Scale

Organoleptic Test Form

Panelist Name :

Date :

Product : Bakwan

In front of you, are now served the samples of bakwan which substitute with banana blossom. You are asked to evaluate the samples by observing for the evaluation of color and texture, smelling for the evaluation of the aroma, and tasting for the evaluation of the flavor. Give a score by using the given scale:

1 = Strongly Disliked; 2 = Disliked, 3 = Liked, 4 = Strongly Liked

- Neutralize your taste sensory each time you will taste a different sample
- Give some break time in between testing one sample for another, a minimum of 30 seconds
- It is not allowed to compare one sample to another

Sample Code	Evaluation Criteria			
	Texture	Aroma	Flavor	Color

Critics and Recommendations:

Thank you

Organoleptic Test Questionnaire
GENERAL GUIDE FOR SENSORY TEST

1. Make **sure not to smoke and/or consume and/or drink foods and/or beverages which have sharp flavor/aroma** within 60 minutes before the sensory test
2. Make sure **not to use any strong aroma perfume** before the sensory test
3. Make sure **not to use any sharp scent cosmetics** before the sensory test
4. Make sure that you already **wash your hands** before the sensory test, and use soap that does not have a strong aroma
5. **Be calm and do not cause any commotion** during the sensory test
6. Tell the chairman panel if you have an allergy or can not consume a certain food
7. Tell the chairman panel if you own any history of disease that can affect the process of the test
8. Tell the chairman panel if you are consuming medicines
9. Taste the samples that are served in the booth one per one according to the given instructions of each test
10. Neutralize your taste sensory with the provided neutralizer each time you will taste another sample
11. Give some break time in between testing one sample for another, a minimum of 30 seconds
12. Give a sign to the chairman panel if there is anything to be asked without bothering other panelists
13. Thank you for your cooperation

PRACTICUM 1

Basic Aroma Matching Test (Matching Test)

Type sample :

Neutralizer : Mineral Water

Instructions :

- Taste the given samples one by one
- Try to recognize each type of flavor, then write down the recognized flavor on the following table
- Neutralize your taste sensory each time you will taste a different sample
- Give some break time in between testing one sample for another, a minimum of 30 seconds
- Please write any additional information in the "note" column if needed
- Write any comment if needed

Sample Code	Type of Recognized Taste	Note
_____	Neutral	_____
_____	Slightly Salty	_____
_____	Very Salty	_____
_____	Slightly Sweet	_____
_____	Very Sweet	_____
_____	Slightly Sour	_____
_____	Very Sour	_____
_____	Slightly Savory	_____
_____	Very Savory	_____

Comment:

PRACTICUM 2

Basic Aroma Screening Test (Matching Test)

Type sample :

Neutralizer :-

Instructions :

- Smell the provided samples per each
- Try to recognize each type of aroma, then write down the aroma which you recognize in the following table
- Neutralize your taste sensory each time you will try another sample by inhaling the air inside the room
- Give some break time in between testing one sample for another, a minimum of 30 seconds
- Please write any additional information in the "note" column if needed
- Write any comment if needed

Sample Code	Type of Recognized Aroma	Note
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

PRACTICUM 3
Crunchiness Test

Type sample :

Neutralizer : Mineral Water

Instructions :

- Observe the given samples one by one
- Sort it out by gathering the sample based on the crunchiness intensity from lowest to highest
- Write down the sample code on the provided space from the lowest crunch intensity to the highest
- Please write any additional information in the "note" column if needed
- Write any comment if needed

	Sample Code	Note
Lowest Crunch Intensity	_____	_____
	_____	_____
	_____	_____
Highest Crunch Intensity	_____	_____
	_____	_____

Comment:

PRACTICUM 4

Acceptance Test/Affection Test: Hedonic Scale Test

Type sample :

Neutralizer : Mineral Water

Instructions :

- Observe and taste the sample in the container that has been provided without comparing it to another sample
- Evaluate each sample to its attribute (color, scent, texture, flavor, mouthfeel, aftertaste, and overalls) by giving a hedonic scale (1-7)
 - 1 = Strongly Disliked
 - 2 = Moderately Disliked
 - 3 = Slightly Disliked
 - 4 = Neutral
 - 5 = Slightly Liked
 - 6 = Moderately Liked
 - 7 = Strongly Liked
- Neutralize your taste sensory each time you will taste a different sample
- Give some break time in between testing one sample for another, a minimum of 30 seconds
- It is not allowed to compare one sample to another

Sensory Attribute	Sample Code (Hedonic Scale)		
Appearance/Color			
Aroma			
Texture			
Flavor			
Aftertaste			
Overall			

- Please write down additional information/comments in the "comment" column when needed

Comment: