Consumption pattern intervention on cassava artificial rice and gluten free noodles

H Herawati* and E Kamsiati
Indonesia Center For Agricultural Post Harvest Research and Development, Jln. Tentara Pelajar No. 12, Bogor, West Java, Indonesia

*herawati_heny@yahoo.com

Abstract. Artificial rice is a staple food product that resembles rice grains from rice which is generally processed from raw materials such as flour. One area in the City of South Cimahi, in the village of Cirendeu. One way to improve food diversification is to intervene in the consumption pattern through the consumption of rice and gluten free noodles from cassava in the North Cimahi City area. The purpose of this research activity is to develop intervention patterns of consumption of rice and cassava free gluten noodles and an analysis of the public health characteristics. The consumption pattern is carried out in Aloe Vera farmer group, Citereup-North Cimahi, West Java. The consumption pattern is carried out by replacing rice from rice as a staple food and replaced with cassava from breakfast and lunch and gluten free noodles from cassava at dinner. The object researches' weight was relatively more stable during the intervention process of consumption patterns, although some object researches showed a pattern of weight loss. The results of the analysis of blood sugar levels prior to and a consumption pattern intervention showed a trend of a decrease in blood sugar levels in some object researches and a slight exclusion indicated an increase in blood sugar.

1. Introduction
Cirendeu village community in the southern city of Cimahi, accustomed to eating constellations or rice from cassava. The constellations produced, have a non-uniform shape and are easily destroyed when distributed over long distances. One way to increase the added value of processes and products is a rice-making process that has a uniform shape and a sturdy structure and is easy to cook. The constellation is a cassava flour made from grains resembling rice granules [1].

Rice is a staple food product that resembles rice grains from rice which is generally processed from raw materials such as flour. Some other terms such as artificial rice [2,3,4], analog rice [5], pearl rice [6], smart rice[7], siger rice [8,9], sorghum rice [10], artificial rice [11-18]. Herawati et al. [1] conducted a rice processing technique from cassava raw materials and with the treatment of the addition of groundnut flour to increase protein content. Some rice processing technology as done by researchers using several granulation techniques [6,2]. Furthermore, Herawati et al [4,17] carried out rice processing techniques using hot extruders.

One alternative to developing rice processing technology is to use cold extruder [1]. The technique can be developed not only to have the ability to process into rice, but by replacing the die mold at the end of the extruder, it can be changed to process noodles and macaroni paste [19]. Herawati et al. [20] analyzed the processing business and BMC (business model canvas) business analysis of gluten free noodle processing in Kampung Cirendeu, Cimahi City.
One way to disseminate rice production techniques is by means of the production process on a scale of SMEs (small and medium industries) and able to be distributed with a wider range. Business improvements to the scale of SMEs were carried out in Cirendeu Village, and the process of intervening in the expansion of consumption patterns was carried out in the Aloe Vera Farmer Group of North Cimahi City. The purpose of this research activity is to develop intervention patterns of consumption of artificial rice and cassava free gluten noodles in Cimahi City and an analysis of the public health characteristics.

2. Materials and methods

Intervention activities of consumption pattern was carried out in Aloe Vera Farmer Group, Citereup-Cimahi Utara, West Java. The activity lasts for 1 month, from 2 October to 2 November 2018. The consumption pattern was carried out by replacing rice from rice as a staple food and replaced with cassava from breakfast and lunch and gluten free noodles from cassava at dinner. As for the side dishes and other added food the same as in general everyday.

The consumption pattern intervention was carried out in one area and involved 40 object researchs who had voluntarily signed an agreement and conducted a health analysis by the Public Health Center declared healthy. The consumption pattern intervention received assistance from a general practitioner from the Cimahi City Health Office.

2.1 The process of providing cassava artificial rice and gluten free noodles
Artificial rice processing technology as stated in Herawati et al [1]. Artificial rice processing stages of cassava flour include: mixing cassava flour with water as much as 25% v/w, steaming for 30 minutes and molding with cold extruder and drying for up to 3 hours using a 100°C oven. In gluten free noodle processing technology as a method for processing gluten free macaroni contained in modified [18]. The modification technique is done by using a die mold that is different from the mold in the macaroni processing.

2.2 Products and health analysis
Proximate analysis of flour, artificial rice and gluten free noodle products was carried out using the AOAC method [21]. Analysis of carbohydrate content was carried out based on the results of calculations by different. Based on the results of the proximate analysis, calorie levels were found in the flour, rice and cassava free gluten noodles.

At the beginning of the activity, a socialization was carried out by doctors representing the Cimahi City Health Office and Citereup Community Health Center medical staff, North Cimahi. Checking the health conditions is done in order to avoid the effects that can be caused due to the intervention process of this consumption pattern. At the beginning of the activity, an analysis of health conditions was also carried out, which included the condition of body weight, sugar levels and cholesterol levels of potential participants in the consumption pattern intervention. Analysis was carried out by medical personnel from Citereup Community Health Center, North Cimahi City. Analysis of the conditions before the intervention of the consumption pattern is carried out on November 2nd, 2018.

Weight analysis is carried out using weight scales. Analysis of blood sugar levels is done by using a blood sugar and blood cholesterol rapid test. Analysis was carried out using the Easy touch GCHB 3 in 1. Based on the results of the analysis also the stocking of health conditions and feedback after the consumption pattern intervention process.

3. Results and discussion

3.1 Consumption pattern intervention
The Cimahi City Food Diversification Team also coordinated the consumption pattern intervention as a form of expanding the consumption patterns of cassava and cassava noodles to the area of the Aloe Vera farmer group, in Citereup City of Cimahi in the North Cimahi section. The intervention involved surveillance from the local health center and the Cimahi City Health Office. Before the intravenous
consumption pattern, a preliminary examination of the health conditions includes weight, height, blood pressure, blood sugar levels and blood cholesterol levels. The pattern of intervention involved representatives of around 40 people who were willing to become object researchs to intervene in consumption patterns.

Figure 1. Initial health examination, logistic distribution for consumption pattern intervention and final health examination.

The consumption pattern intervention was carried out using a two-meal constellation pattern and one meal with a portion of the main ingredient in the form of cassava-free gluten noodles. The consumption pattern intervention is carried out with the agreement of the Food Diversification Team conducted for one month.

3.2. Proximate analysis of flour, artificial rice and gluten free noodle

Proximate content analysis was carried out on flour, artificial rice, gluten free noodle samples using the main raw material in the form of cassava. Proximate levels include moisture, ash, fat, protein, carbohydrate and energy produced. Based on the results of the analysis obtained the results as listed in Table 1 below.

| No | Analysis                      | Flour | Artificial Rice | Gluten free noodle |
|----|-------------------------------|-------|-----------------|-------------------|
| 1  | Moisture Content (% wb)       | 8.78  | 11.67           | 8.06              |
| 2  | Ash Content (% wb)            | 0.52  | 0.68            | 2.65              |
| 3  | Fat Content (% wb)            | 2.45  | 0.21            | 0.42              |
| 4  | Protein Content (% wb)        | 0.94  | 1.29            | 3.30              |
| 5  | Carbohydrate Content (% wb)   | 87.32 | 86.15           | 85.58             |
| 6  | Energy (kcal)                 | 367.50| 351.67          | 359.58            |

Based on the results of proximate analysis the main components found in flour, artificial rice and gluten free noodles from cassava consist of carbohydrates. Components of fat and protein found in rice and gluten free noodles are quite low compared to rice found in rice and wheat noodles. Based on the results of proximate level analysis, with the addition of flour adherents, the protein and fat content of constellations produced increased [1]. Herawati et al [4] stated that the protein content of rice from rice was 11.66% and the fat content was 3.41%. Instant artificial rice protein levels processed from corn flour and tapioca have a fat content of 0.59% and a protein content of 6.34% [17]. This shows that the flour composition used affects the proximate content of the rice produced.

Afifah and Ratnawati [22] conducted research on the processing technology of gluten free noodles using raw materials in the form of a mixture of mocaf flour (modified cassava flour), rice flour and corn flour. The different types and concentrations of these ingredients affect the protein content of the noodles produced. The highest protein content is 5.58% found in the composition of the use of mocaf flour 40% the mocaf flour, 30% rice flour, and 30% corn flour. Protein content is 4.09% found in noodles with the highest addition of mocaf flour, namely the use of 70% mocaf flour and 30% rice flour.
3.3. Weight analysis
One way to detect the acceptability of products and changes in consumption patterns, by analyzing the changes in body weight due to the intervention of consumption patterns that have been carried out for one month. Changes that occurred in object research due to changes in the pattern of the main meanings consumed to the object research’s body weight obtained results as listed in Figure 2 below.

![Figure 2](image)

Figure 2. Graph of body weight before and after the intervention of consumption patterns of cassava artificial rice and gluten free noodle.

Based on the results of the consumption pattern intervention, the object research’s body weight was relatively more stable, although some object researchs showed a pattern of weight loss. The existence of weight loss can be caused by the composition contained in the basic foodstuffs, artificial rice and gluten free noodle that have changed from paddy rice.

Based on the calculation of the amount of energy contained in artificial rice and gluten free noodle that were equal to 351.67 kcal and 359.58 kcal. Whereas in broken rice skin energy obtained by 362 kcal [23]. Furthermore, Vazquez et al. [24] stated that the existence of changes in eating patterns, can affect weight loss. While, McIntosh et al. [25] intervened by giving bread and margarine from Barley and wheat and resulted in a slight insignificant change in the body weight of object researchs.

3.4. Blood sugar analysis
Analysis of blood sugar levels is done before and after the process of consumption pattern intervention. The existence of an increase in blood sugar levels is strongly related to the material used and its effect on an increase in blood sugar levels of the object researchs. The staple food replacement pattern which was originally in the form of rice from paddy rice was replaced with artificial rice and gluten free noodle from raw materials in the form of cassava flour, resulting in changes in blood sugar levels of the object researchs as shown in Figure 3 below.

![Figure 3](image)

Figure 3. Graph of blood sugar before and after the intervention of consumption patterns of cassava artificial rice and gluten free noodle.

Overall, based on the results of the analysis of blood sugar levels before and a consumption pattern intervention showed a trend of a decrease in blood sugar levels in some object researchs and a slight outline showed an increase in blood sugar. The macronutrient composition is important for glucose
response, with CHO as the food component that acts directly on glycemia, rising it and stimulating insulin secretion [26].

3.5. Cholesterol level analysis
One of the health parameters of the object researchs that can be observed is the cholesterol levels found in object researchs both before and after the consumption pattern intervention. In this research activity that can be done is by controlling the staple food in the form of artificial rice and gluten free noodles from cassava. For the type of food added and the use of other side dishes can’t be controlled can be assumed the same as when consuming staple foods in the form of rice from paddy. Cholesterol levels before and after the intervention process of consumption patterns of the object researchs were obtained as shown in Figure 4.

![Figure 4](image-url)

**Figure 4.** Cholesterol graphs before and after intervention in the consumption patterns of cassava artificial rice and gluten free noodle.

Whereas the results of the average cholesterol analysis before the consumption pattern have shown that there are quite high cholesterol levels in the object researchs. This is possible because their diets often consume fried foods. However, based on overall trends, there is a pattern of decreasing overall blood cholesterol levels.

There are several factors that affect blood cholesterol levels including the cholesterol component found in food, fat content and fiber consumption [25]. Furthermore McIntosh et al. [25] observed the effect of fiber levels on blood cholesterol levels, where in Barley which contains β glucans and contains lots of fiber can reduce blood cholesterol levels in object researchs.

4. Conclusions
Proximate analysis of the main components found in flour, artificial rice and gluten free noodle from cassava consists of carbohydrates. Components of fat and protein found in rice and gluten free noodles are quite low compared to rice found in rice and wheat noodles.

The object researchs’ weight was relatively more stable during the intervention process of consumption patterns, although some object researchs showed a pattern of weight loss. The results of the analysis of blood sugar levels prior to and a consumption pattern intervention showed a trend of a decrease in blood sugar levels in some object researchs and a slight exclusion indicated an increase in blood sugar. Based on overall trends, there is a pattern of decreasing overall blood cholesterol levels. Requires longer term interventions with a wider network of object research populations.

Acknowledgement
Thank you to the DIPA Agricultural Research and Development Agency through the Indonesia Center For Agricultural Post Harvest Research and Development Center for funding this research activity. Acknowledgments were also conveyed to the Aloe Vera Farmers Group who were willing to become object researchs and the tanks to the Cimahi City Government who helped smooth the research activities.
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