

BUKTI KORESPONDENSI

ARTIKEL JURNAL INTERNASIONAL BEREPUTASI

JUDUL ARTIKEL : A novel vegetarian Food based on Balinese Traditional foods : variety, processing, and nutrition
JURNAL : Canrea Journal:Food Technology, Nutritions, and Culinary, 2022;Vol 5 , Issue 1: Halaman 80-89
PENULIS : Ni Putu Eka Trisdayanti, AA.Gd.Putra KP. Dalem, and Made Purwa Dana Atmaja

NO.	Perihal	Tanggal
1.	Bukti Submit artikel dan artikel yang disubmit	28 Juli 2021
2.	Bukti artikel diminta revisi (Request Revision)	22 Oktober 2021
3.	Bukti konfirmasi review dan hasil review pertama	22 April 2022
4.	Bukti konfirmasi submit revisi pertama dan artikel yang diresubmit	23 April 2022
5.	Bukti artikel yang telah di proofreading dan bukti proof reading dari lembaga	5 Mei 2022
6.	Bukti artikel final production	10 Mei 2022

BUKTI SUBMIT ARTIKEL DAN ARTIKEL YANG DISUBMIT

28 JULI 2021

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THE STUDY OF BALINESE VEGETARIAN FOOD (Variety, Processing, and Nutrition)

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Abstract

Changing the diet to a vegetarian is certainly not as easy as imagined. Most people are very dependent on the delicious taste of meat. Moreover, Balinese food which is dominant with meat with its special spices is very difficult to leave. In addition, tourists especially vegetarians and adherents of certain religions, will find it difficult if they want to try Balinese food, which is predominantly made of meat. Considering these problems, several vegetarian stalls in Bali have innovated by processing Balinese vegetarian menus. The author conducted interviews and observations to vegetarian food stalls selling Balinese vegetarian dishes to find out the type/variety and processing process. Then the sample of Balinese vegetarian cuisine was tested for its nutritional content to the Udayana University Food Analysis Laboratory. The data analysis technique in this study was descriptive qualitative. The Balinese vegetarian foods found were *sate lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *sate tusuk*, and *urutan*; which is made similar to processing typical Balinese food using Balinese spices (*base genep*), only animal ingredients are replaced with vegetable ingredients. All Balinese vegetarian food contains good nutrition

Article History

Received xxxxxx

Accepted xxxxxx

Keyword

Balinese Vegetarian
Food, Variety,
Processing, Nutrition

1. Introduction

Given the severity of the risk of disease due to eating meat, many people turn to a vegetarian diet, which is considered to be more secure for the body's health. Vegetarian is a term for people who only eat plants and do not eat foods derived from living things such as meat and poultry, but still may eat seafood such as fish, or processed animal products such as eggs, cheese, milk(1). Because of the fear of potential disease, there are people who try to reduce meat consumption and there are also those who even become pure vegetarians who do not eat meat and its derivatives. The phenomenon of switching to a vegetarian diet is happening all over the world. This is evidenced by the results of surveys in several countries from year to year which show an increasing number of people who follow a vegetarian diet. The results of a survey conducted by the American Dietetic Association (ADA) show the number of vegetarians in 2006, about 4.9 million (2.3%) adults in America

became vegetarian and about 1.4% became vegan, while in Canada about 900 people adult population becomes vegetarian(2). The number of vegetarians registered in the Indonesia Vegetarian Society (IVS) when it was founded in 1998 was around 5,000 members and increased to 60,000 members in 2007(3).

Changing the diet to a vegetarian is certainly not as easy as imagined. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch to plant foods. Moreover, Balinese food which is dominant with meat with its special spices is very difficult to remove. Plus most of the vegetarian stalls sell Chinese food menus which are not necessarily accepted by the Balinese tongue in particular. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to try Balinese specialties, which are predominantly made from meat. And especially for certain religions such as Islam, which in their belief is not allowed to eat pork, while Balinese specialties are mostly made from pork.

Considering these problems where tourists come from various backgrounds and to meet all the needs of the community and tourists, several vegetarian stalls in Bali have innovated by processing Balinese vegetarian menus. Vegetarian cuisine that is processed using vegetable ingredients with a touch of Balinese culinary arts such as Balinese spices (*base genep*) and the resulting product also resembles Balinese food. The existence of these stalls can complete all the needs of the community and tourists.

Based on the author's preliminary survey, there is a type of vegetarian cuisine, namely *Tum* which is processed with artificial meat and Balinese spices so that it looks and tastes similar to *Tum* from meat. And according to the writer's respondent, who is vegetarian, admits that there are many more types of Balinese vegetarian food that are sold in several vegetarian stalls in Bali. As a start, the research was conducted in Gianyar Regency, namely Ubud, where the Ubud area was designated by UNWTO as an International Gastronomic Destination.

Based on this phenomenon, the authors are interested in surveying vegetarian food stalls selling Balinese vegetarian food, then surveying the types/varieties of Balinese vegetarian food sold in the Ubud area, then also researching the ingredients and processing processes. and the nutritional content of these dishes, given the lack of information on the nutritional value of vegetarian dishes, which will be compared with the nutrition of Balinese (animal) dishes.

2. Materials and Methods






The author conducted interviews and observations to vegetarian food stalls that sell vegetarian dishes with a touch of Balinese culinary arts to find out the types/varieties and processing processes. Then the author brought samples of Balinese vegetarian dishes to be tested for nutritional content (carbohydrates, protein, fat, and energy) to the Food Analysis Laboratory of Udayana University, Jl. PB. Sudirman Denpasar. The data analysis technique in this research is descriptive qualitative. The results of interviews and observations regarding the types/varieties, processing processes and laboratory test results of the nutritional content of Balinese vegetarian dishes are systematically arranged, presented in the form of narrations and tables, compared with the results of other studies on nutritional tests of Balinese specialties (animal-based) and obtained conclusions from the results of the study.

3. Results and Discussion

3.1. Types of Balinese Vegetarian Food in Ubud Gianyar

Based on the results of the author's survey in the Ubud Gianyar area, obtained types/varieties of Balinese vegetarian food sold in the area, in detail in table 1 below.

Tabel 1. Types of Balinese Vegetarian Food in Ubud Gianyar

No	Types of Balinese Vegetarian Food	Picture
1.	<i>Sate lilit</i>	
2.	<i>Sayur urap</i>	
3.	<i>Kuah kare</i>	
4.	Balinese soup	
5.	<i>Lawar</i>	
6.	<i>Tum</i>	

7. *Betutu*



8. *Dendeng/ati*



9. *Sisit*



10. *Sate tusuk*



11. *Urutan*



3.2. Balinese Vegetarian Food Processing in Ubud Gianyar

To find out how to process Balinese vegetarian food in Ubud Gianyar, the author conducted a survey to food stalls and interviewed sellers. The following is a summary of how to process Balinese vegetarian food.

Tabel 2. Balinese Vegetarian Food Processing Method

No	Type of Balinese Vegetarian Food	Processing Method
1.	<i>Sate lilit</i>	Young jackfruit that has been boiled and mashed is added with boiled green beans that have been blended, added <i>base genep</i> , grated coconut, tapioca flour, salt, pepper, brown sugar, coriander. Then the dough is shaped, wrapped, and fried
2.	<i>Sayur urap</i>	<ul style="list-style-type: none"> Boiled vegetables (spinach, sprouts, long beans), remove and drain Mix with grated coconut, <i>sambel embe</i>, fried onions, limes
3.	<i>Kuah kare</i>	Vegetables (pumpkin, long beans, carrots) cooked with general spices, coconut milk and sprinkled with fried onions
4.	Balinese soup	Vegetables (pumpkin, long beans, carrots, spinach, corn) cooked with general spices and sprinkled with fried onions.
5.	<i>Lawar</i>	<ul style="list-style-type: none"> Long beans are boiled until cooked (not mushy), then cut into short pieces Peel and cut papaya into matchstick size, sprinkle with salt Boil papaya until cooked (not mushy), drain and squeeze Boil the protein, remove and drain, coarsely chopped Cut the small hyssoma lengthwise Mix the protein, grated coconut, and hisom, add the <i>base selem</i> and <i>sambal embe</i>, season with salt and lemon juice, squeeze, and mix well Add pieces of long beans and stir until thoroughly blended <i>Lawar</i> long beans is ready to be served
6.	<i>Tum</i>	<ul style="list-style-type: none"> Make kalasan coconut milk (by boiling coconut milk with <i>base genep</i>) Kalasan coconut milk is mixed with boiled and chopped protein, hisom cut lengthwise, <i>kluwek</i> that has been pulverized, fried onion sauce, fried onions, salt, seasoning wrapped in banana leaves The dough is wrapped in banana leaves and steamed for 45 minutes
7.	<i>Betutu</i>	<ul style="list-style-type: none"> Gluten cut and shredded Combine the shredded gluten with spices, add salt, and mix well Wrap the mixture with banana leaves, add bay leaf and cook by steaming for 30 minutes
8.	<i>Dendeng/ati</i>	<ul style="list-style-type: none"> Green beans soaked day, blended (add coriander and salt), boiled/steamed, cooled, thinly sliced, and fried jerky/fried liver Seasonings (garlic, shallots, chilies, tomatoes, candlenuts, brown sugar) are pulverized, sauteed with water until cooked, add the fried liver/dendeng that was cooked with the spices
9.	<i>Sisit</i>	<ul style="list-style-type: none"> Gluten boiled, add soy sauce, stir, let stand for a while, baked Add seasoning (can be <i>sambal matah</i>)
10.	<i>Sate tusuk</i>	<ul style="list-style-type: none"> Large protena scalded with hot water, drained Seasonings (garlic, coriander, candlenut, chili, brown sugar, salt and

	seasoning) are blended, stir-fried, add water, add protein and cook until the water runs out. The satay is skewered and grilled
	<ul style="list-style-type: none">• Make peanut sauce (fried peanuts, blended), boiled until thickened, added with soy sauce, fried onions and lime
11. <i>Urutan</i>	<ul style="list-style-type: none">• <i>Base genep</i> sauteed until cooked, mixed with protein that has been doused in hot water, added 1 tablespoon of wheat flour and 1 tablespoon of tapioca flour• Place the dough on top of the beancurd, rolled, steamed, and briefly fried

Several vegetarian stalls/restaurants in Ubud Bali have innovated by processing Balinese vegetarian menus. Vegetarian cuisine that is processed using vegetable ingredients with a touch of Balinese culinary arts such as Balinese spices (*base genep*) and the resulting product also resembles Balinese food. The existence of these stalls/restaurants can complete all the needs of the community and tourists.

Based on the table above, all animal ingredients in the manufacture of vegetarian/vegan foods are replaced with vegetable ingredients, such as meat and even flavorings that are not sourced from animals. The flavoring used is usually made from mushrooms. For vegans/vegetarians animal meat ingredients are replaced with artificial meat. Artificial/fake meat is a food ingredient whose shape, texture, and taste is very similar to meat, but it does not contain animal products at all. Usually meat substitutes are made from mushrooms, tempeh, tofu.

Based on information from the cook, food ingredients commonly used as a substitute for meat in Balinese vegetarian food processing:

a. Protena

Protena in the market is known by the trademark Proteina. Proteina contains vegetable protein from pure soybeans that have been separated from the oil, without the addition of other ingredients.

b. Haisom

Haisom vegetarian is a product that contains vegetable protein, mushrooms, wheat, vegetable spices. The cooking method is quite easy, namely by sautéing, to mix in capjay, or cooked in vegetarian oyster sauce

c. Gluten

Gluten can be used to make imitation meats for vegetarian and vegan dishes. Gluten is an amorphous mixture (irregular form) of protein that is contained with starch in the endosperm (and also flour made from it) of some cereals, especially wheat, rye, and barley. Of the three, wheat is the highest in gluten content. Gluten content can reach 80% of the total protein in flour, and consists of gliadin and glutenin proteins. Gluten makes dough chewy and expands because it is airtight (4).

In addition to the above, there are other interesting things that researchers found. In the process of making Balinese *tum*, fresh blood is usually used as *tum* dye, but in cooking vegan *tum*, *kluwek* is used instead of blood. However, the informant expressed caution in using *kluwek*. *Kluwek* contains cyanide, a type of poison that can harm health if consumed directly. The highest content of cyanide is found in the flesh of *kluwek* seeds. That is the

reason that *kluwek* must be soaked first to remove the poison before being processed into cooking

Kluwek produces fruit that can be consumed and has the potential as medicine and herbs. This plant is rarely found due to lack of information about the usefulness of *kluwek* products as well as public knowledge about cultivation techniques and post-harvest processing which causes people to be less interested in cultivating *kluwek* plants(5).

3.3. Nutritional Content of Balinese Vegetarian Food

Based on the results of the nutrition test at the FTP Unud Lab on Balinese vegetarian food, the following results were obtained :

Tabel 3. Nutritional Content of Balinese Vegetarian Food

No	Type of Balinese Vegetarian Food	Nutrient Content					
		Water content (%bb)	Ash Content (%bb)	Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)
1.	<i>Sayur Urab Vegan</i>	83.07	1.33	2.61	6.51	6.48	94.93
2.	<i>Balinese Soup Vegan</i>	88.70	1.24	3.21	1.94	4.90	49.93
3.	<i>Kare Vegan</i>	81.28	1.28	6.09	5.20	6.14	95.78
4.	<i>Sate Tusuk Vegan</i>	60.44	2.37	11.75	10.69	14.76	202.23
5.	<i>Tum Vegan</i>	53.31	1.38	7.75	12.97	24.6	246.07
6.	<i>Sate Lilit Vegan</i>	37.74	2.43	5.17	26.69	27.97	372.76
7.	<i>Lawar Vegan</i>	75.25	1.10	2.67	10.95	10.03	149.38
8.	<i>Ati vegan</i>	8.45	3.52	14.47	32.71	40.84	515.68
9.	<i>Sisit Vegan</i>	50.65	1.77	20.05	10.24	17.28	241.48
10.	<i>Betutu Vegan</i>	60.72	1.47	14.6	13.8	9.43	220.12
11.	<i>Urutan Vegan</i>	35.1	2.88	6.58	33.89	21.56	417.59

To analyze the data on the nutritional content of Balinese vegetarian food, the authors compared these results with the nutritional content of non-vegan Balinese dishes from other studies.

Tabel 4. Comparison of the Nutrient Content of Vegan Balinese Cuisine with Non Vegan

No	Type of Food	Nutrient Content				Comparison Results
		Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)	
1	<i>Sate lilit vegan</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> Protein content of <i>sate lilit vegan</i> > <i>sate lilit</i> from meat, but < <i>sate lilit babi</i> (pork)
	<i>Sate lilit daging (meat)</i> (6)	5.74	23.29	24.89		

	<i>Sate lilit babi</i> (pork)(7)	27,02	2,93	15,64		<ul style="list-style-type: none"> • Fat content of <i>sate lilit vegan</i> > <i>sate lilit babi</i> (pork), but < <i>sate lilit daging</i> (meat) • Carbohydrate content of <i>sate lilit vegan</i> lowest compared with <i>sate lilit daging</i> (meat) and <i>sate lilit babi</i> (pork)
2	<i>Lawar vegan</i>	2.67	10.95	10.03	149.38	<ul style="list-style-type: none"> • Lowest protein and fat content of <i>lawar vegan</i> • Carbohydrate of <i>lawar vegan</i> > <i>lawar sapi</i> (beef), but < <i>lawar babi</i> (pork)
	<i>Lawar sapi</i> (beef) (8)	11.14	18.0	6.61		
	<i>Lawar babi</i> (pork)	5.74	13.87	11.97		
3	<i>Betutu vegan</i>	14.6	13.8	9.43	220.12	<ul style="list-style-type: none"> • Protein of <i>betutu vegan</i> < <i>betutu ayam</i> • Fat, Carbohydrate, and calories of <i>betutu vegan</i> > <i>betutu ayam</i>
	<i>Betutu ayam</i> (chicken) (6)	20.6	7.82	4.54	170.98	
4	<i>Urutan vegan</i>	6.58	33.89	21.56	417.59	<ul style="list-style-type: none"> • Protein of <i>urutan vegan</i> < <i>urutan daging</i> (meat) • Fat, Carbohydrate, and calories of <i>urutan vegan</i> > <i>urutan daging</i> (meat)
	<i>Urutan daging</i> (meat)(6)	25.66	27.8	1.99	361.53	
5	<i>Tum vegan</i>	7.75	12.97	24.6	246.07	<ul style="list-style-type: none"> • Protein of <i>tum vegan</i> < <i>tum daging</i> (meat) • Fat, Carbohydrate, and calories of <i>tum vegan</i> > <i>tum daging</i> (meat)
	<i>Tum daging</i> (meat) (6)	18.25	11.09	4.64	191.37	
6	<i>Sate tusuk vegan</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> • Protein of <i>sate tusuk vegan</i> < <i>sate languan</i> (fish) • Carbohydrate of <i>sate tusuk vegan</i> > <i>sate languan</i> (fish)
	<i>Sate languan</i> (fish) (6)	12.50	14.30	12.87	230.18	

Based on the table above, it can be seen that it is not certain that meatless dishes are lower in carbohydrate, protein, fat, and calorie content. It depends on the material used. Like processing vegan food using plant-based meat (gluten), for example, these ingredients are also high in carbohydrates because they are sourced from starchy flour. In addition, the cooking method/processing method also has an impact on the nutritional content of the food. Vegan food if processed using a lot of oil / fried can also increase the fat and calorie

content. From the data above, it cannot be determined which food is better, because it all depends on the needs of consumers. The nutritional content data can be used as a guide for the community in making food choices.

4. Conclusions

Balinese vegetarian food like *sate lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *sate tusuk*, and *urutan*; which is made similar to Balinese food processing using Balinese spices (*base genep*), only animal ingredients are replaced with vegetable ingredients. All Balinese vegetarian food contains good nutrition.

Acknowledgements

The author would like to thank the Bali Tourism Polytechnic (Politeknik Pariwisata Bali) especially the Research and Community Service Unit (P3M PPB) which has provided research funding assistance.

Author Contributions

For this research, Ni Putu Eka Trisdayanti in the idea, writing, and coordinating all research processes. For AA. Gd. KP. Dalem and Made Purwa Dana Atmaja contributed to the survey activities in the field.

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BUKTI REQUEST REVISION

22 Oktober 2021

The screenshot shows the author dashboard for Canrea Journal. The page title is "Canrea Journal: Food Technology, Nutritions, and Culinary Journal". The submission ID is 461, by Trisdayanti et al., titled "A novel vegetarian food based on Balinese traditional foods: variety, processing, and nutrition". The workflow is shown as "Publication" with sub-steps: "Submission", "Review", "Copyediting", and "Production". Under "Submission", there are "Round 1" and "Round 2" tabs. The "Round 2 Status" is "Submission accepted." A notification from "[canrea] Editor Decision" is dated 2021-10-22 08:40 AM.

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A NOVEL VEGETARIAN FOOD BASED ON BALINESE TRADITIONAL FOODS : Variety, Processing, and Nutrition

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Abstract

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch into plant-based foods. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. With these issues in mind, and in order to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. Sample of Balinese traditional plant-based foods was analyzed for its nutritional content. The data was analyzed using descriptive qualitative method. The Balinese traditional plant-based foods that found in Ubud were *satai lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *satai*, and *urutan*; which is made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

Article History

Received xxxxxx

Accepted xxxxxx

Keyword

Balinese traditional
plant-based foods,
Variety, Processing,
Nutrition

1. Introduction

Plant-based eating preference that emphasize fruits, vegetables, whole grains, legumes, nuts, and seeds is known as vegetarian diets. These diets are frequently thought to be meatless and animal free. There are many types of vegetarian diets, the most common of which are semi-vegetarian, pescatarian, and vegan. Given the severity of the risk of disease due to eating meat, many people turn to a vegetarian diet, which is considered to be more secure for the body's health. Vegetarian is a term for people who only eat plants and do not eat foods derived from living things such as meat and poultry, but still may eat seafood such as fish, or processed animal products such as eggs, cheese, milk(1). The reasons for adopting certain eating preference vary, and include ethical considerations, religious convictions, environmental and cultural concerns, as well as health-related considerations. (2,3). According to the American Dietetic Association (ADA), over 4.9 million (2.3%) adults in America turned vegetarian in 2006, and approximately 1.4% went vegan, while approximately 900 adults in Canada became vegetarian (We recommend that you display the latest data regarding the number of vegetarians in America). (4). In Indonesia, the number of vegetarians registered in the Indonesia Vegetarian Society (IVS) increase significantly. In 1998, the

number of registered vegetarians was around five thousands, and it has increased to sixty thousands registered members in 2007.(3).

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch into plant-based foods. Moreover, Balinese traditional foods, which are generally made from meat with its special spices, are very difficult to replace. Majority of vegetarian stalls, which sell Chinese vegetarian cuisine, are not necessarily accepted by the Balinese in particular. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. Moreover, due to religious belief, many visitors are not allowed to eat pork or beef.

With these issues in mind, and in order to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. These vegetarian cuisines are prepared using vegetables and a touch of Balinese culinary arts such as Balinese spices (*base genep*), with the end result resembling Balinese cuisine. The presence of these stalls can meet all of the community's and tourists' needs.

In our preliminary survey, we found that there is a type of vegetarian cuisine, namely *Tum* that is processed from an analogue meat made of high protein legums such as soybeans, mungbeans, etc. combine with Balinese spices. This analogue meat looks and tastes similar to *Tum* from meat. In addition, there are several forms of Balinese traditional plant-based meals available at vegetarian stalls throughout Bali. As a start, the research was undertaken in Gianyar Regency, specifically in Ubud, where the Ubud area has been declared as an International Gastronomic Destination by the UNWTO.

In order to establish a baseline nutritional data on some of the most popular vegetable-based traditional Balinese foods, it is important to conduct nutritional analysis. Therefore, the aim of this study was to establish the nutritional content of traditional Balinese plant-based foods and compare them to the nutritional value of Balinese meat-based cuisines. Additionally, the authors also conducted a survey on the types or varieties of Balinese vegetarian foods sold in the Ubud area, including the ingredients used and their processing techniques.

2. Materials and Methods

We conducted interviews and observations at all vegetarian food stalls selling traditional Balinese vegetable dishes in Ubud Gianyar area. The information gathered included the types of vegetarian foods sold at each stall and their processing techniques. The nutritional content (carbohydrates, moisture, protein, fat, and calorie content) was then analysed using standard methods. Data were analysed using quantitative and qualitative approach. The findings from this study were compared to those of previous studies on Balinese specialties (animal-based).

3. Results and discussion





3.1. Types of Balinese traditional plant-based foods in Ubud Gianyar







Table 1 summarizes the types and varieties of Balinese traditional plant-based foods that were sold in the Ubud Gianyar area. In total, there were eleven types of plant-based

Balinese traditional foods found in the study area. These include *sate lilit* made from jackfruit meat, *lawar* made from stringbeans, *tum* and *urutan* made from analogue meats, *betutu* and *sisit* made from gluten, *dendeng* made from mungbeans, sayur urap, kuah kare, and Balinese soup, all made from vegetables.

The processing methods and materials used for these plant-based foods are shown in Table 2. The main ingredients for these dishes comes from leafy vegetables, beans, coconut milk, jackfruit meat, papaya, mungbean, stringbean, gluten, and analogue meat.

Table 1. Types of Balinese traditional plant-based foods in Ubud Gianyar

No	Types of Balinese traditional plant-based foods	Picture
1.	<i>Sate lilit</i> (there is no foto)	
2.	<i>Sayur urap</i>	
3.	<i>Kuah kare</i>	
4.	Balinese soup	
5.	<i>Lawar</i>	

6. <i>Tum</i>	
7. <i>Betutu</i>	
8. <i>Dendeng/ati</i>	
9. <i>Sisit</i>	
10. <i>Sate tusuk</i>	
11. <i>Urutan</i>	

Tabel 2. Balinese traditional plant-based Food Processing Method

No	Type of Balinese traditional plant-based Food	Processing Method
1.	<i>Sate lilit</i>	Young jackfruit meat was boiled, mashed, and combined with mixture of mung beans, <i>base genep</i> , grated coconut, tapioca flour, salt, pepper, brown sugar, and coriander. This mixture was formed into dough, shaped, wrapped, and deep fried.
2.	<i>Sayur urap</i>	Vegetables (spinach, sprouts, string beans) were cleaned, boiled and drained. The boiled vegetables were added and mixed with grated coconut, <i>sambel embe</i> , fried onions, and limes.
3.	<i>Kuah kare</i>	Vegetables (pumpkin, string beans, and carrots) were cleaned and cooked with spices, coconut milk, then sprinkled with fried onions.
4.	Balinese soup	Vegetables (pumpkin, string beans, carrots, spinach, and corn) were cleaned and cooked with spices, then sprinkled with fried onions.
5.	<i>Lawar</i>	String beans were cleaned and boiled until cooked (not mushy), then cut into short pieces. Papaya were cleaned, peeled and cut into matchstick size, then sprinkle with salt. The matchstick papaya were boiled until cooked (not mushy), drain and squeeze. The analogue meat was used to replace the beef. The analogue meat were cleaned, cooked, drained, and coarsely chopped. Cut the small haisom (hysom imitation) lengthwise. The analogue meat were mixed with grated coconut, then the <i>base selem</i> and <i>sambal embe</i> were added into the mixture. The mixture was seasoned with salt and lemon juice, squeezed, and mixed well. String beans were added then stirred until thoroughly blended.
6.	<i>Tum</i>	<i>Base genep</i> was boiled into coconut milk to make <i>Kalasan</i> coconut milk, then mixed with boiled and chopped analogue meat and pulverized <i>kluwék</i> . The mixture were added with fried onion sauce, fried onions, salt, seasonings. The mixture was wrapped in banana leaves and steamed for 45 minutes.
7.	<i>Betutu</i>	Gluten dough was cut and shredded. The shredded gluten dough was mixed with spices and salt. The mixture was wrapped with banana leaf and steamed for 30 minutes.
8.	<i>Dendeng/ati</i>	Mung beans were soaked for a day and drained, then added with coriander, salt. The mixture were steamed and cooled. The cooled mixture was thinly sliced and added with pulverized garlic, shallots, chilies, tomatoes, candlenuts, brown sugar which already sautéed with water until cooked.
9.	<i>Sisit</i>	Gluten dough was boiled, added with soy sauce, stirred, let stand for a while then baked. This dish can be served with <i>sambal matah</i> .
10.	<i>Sate tusuk</i>	Vegetable protein comes from soybean scalded with hot water and drained. The blended garlic, coriander, candlenut, chili, brown sugar, and salt were first stir-fried, then water and vegetable protein were added, and cooked to dry. The seasoned vegetable protein was skewered and grilled. Peanut sauce (fried peanuts were blended, boiled until thickened and added with soy sauce, fried onions and lime) was used as dipping sauce.
11.	<i>Urutan</i>	<i>Base genep</i> sauteed until cooked, mixed with meat analogue that has been

doused in hot water, and added with 1 tablespoon of wheat flour and 1 tablespoon of tapioca flour. The dough was placed the on top of the beancurd, rolled, steamed, and fried briefly.

Several vegetarian stalls and restaurants in Ubud Bali already made an innovation by produce Balinese traditional plant-based Food. Vegetarian cuisine prepared with vegetable products and infused with Balinese culinary arts such as Balinese spices (base genep), with the end result resembling Balinese meal. The existence of these stalls and restaurants can complement all the needs of the community and tourists.

Animal-based ingredients in traditional Balinese foods can be replaced with vegetable-based ingredients, such as meat analogue and plant-based flavorings. The flavoring used include plant-based materials such as coriander, mushroom, peppers, etc. Meat analogue is a food ingredient whose shape, texture, and taste are very similar to meat, but it does not contain animal products at all. Usually, meat analogue are made from mushrooms, tempeh, tofu, and jackfruit meat. Some of the most common plant-based ingredients used in plant-based Balinese traditional foods include:

- a. Proteina known in the market by the trademark Proteina. Proteina contains vegetable protein from pure soybeans, that have been separated from the oil, without the addition of other ingredients.
- b. Haisom is a vegetable-based product that contains vegetable protein, mushrooms, wheat, vegetable spices. The cooking method is quite easy, namely by sautéing, to mix in capjay, or cooked in vegetarian oyster sauce.
- c. Gluten can be used for vegetarian and vegan dishes. Gluten is an amorphous (irregular form) of protein found in the endosperm (and also flour made from it) of certain cereals, most notably wheat, rye, and barley. Wheat contains the most gluten of the three. Gluten can account for up to 80% of total protein in flour and is composed of gliadin and glutenin proteins. Gluten is used to make dough chewy and expands. (5).

Tum is traditionally produce using fresh blood as dye. In production of vegan *tum*, fresh blood is substituted using *kluwek*. *Kluwek* fruit meat has the potential to be used as medicine and herbs (6). However, before it is used as food ingredients, *kluwek* must be sliced and soaked in water to remove undesirable compounds such us cyanide, a toxic substance that can be harmful to the body.

3.2. Nutritional Content of Balinese traditional plant-based Food

Nutritional contents of Balinese traditional plant-based foods are shown in Table 3.

Tabel 3. Nutritional Content of Balinese Traditional Plant-Based Foods

No	Type of Balinese Vegetarian Food	Nutrient Content					
		Water content (%bb)	Ash Content (%bb)	Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)
1.	<i>Sayur Urab</i> <i>Vegan</i>	83.07	1.33	2.61	6.51	6.48	94.93
2.	<i>Balinese Soup</i>	88.70	1.24	3.21	1.94	4.90	49.93

Vegan							
3.	<i>Kare Vegan</i>	81.28	1.28	6.09	5.20	6.14	95.78
4.	<i>Sate Tusuk Vegan</i>	60.44	2.37	11.75	10.69	14.76	202.23
5.	<i>Tum Vegan</i>	53.31	1.38	7.75	12.97	24.6	246.07
6.	<i>Sate Lilit Vegan</i>	37.74	2.43	5.17	26.69	27.97	372.76
7.	<i>Lawar Vegan</i>	75.25	1.10	2.67	10.95	10.03	149.38
8.	<i>Ati vegan</i>	8.45	3.52	14.47	32.71	40.84	515.68
9.	<i>Sisit Vegan</i>	50.65	1.77	20.05	10.24	17.28	241.48
10.	<i>Betutu Vegan</i>	60.72	1.47	14.6	13.8	9.43	220.12
11.	<i>Urutan Vegan</i>	35.1	2.88	6.58	33.89	21.56	417.59

The results of nutritional value of Balinese traditional plant-based foods was compared with other studies of Balinese specialties (animal-based).

Tabel 4. Comparison of the Nutrient Content of Balinese traditional plant-based Foods with Balinese traditional animal-based Foods. You can first calculate the caloric value of the animal-based product → compare it with the caloric value of the plant-based product

	Food	Nutrient Content				Comparison Results
		Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kkal)	
1	<i>Vegan satai lilit</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> • Protein content of <i>sate lilit vegan</i> was higher than <i>sate lilit</i> from beef, but lower than <i>pork satai lilit babi</i> • Fat content of <i>sate lilit vegan</i> was higher than <i>pork satai lilit</i>, but lower than beef <i>satai lilit</i> • Carbohydrate content of <i>sate lilit vegan</i> lowest compared with beef <i>satai lilit</i> and pork <i>satai lilit</i>
	<i>Beef satai lilit (6)</i>	5.74	23.29	24.89	332.13	
	<i>Pork satai lilit babi (7)</i>	27,02	2,93	15,64	197.01	
2	<i>Vegan Lawar</i>	2.67	10.95	10.03	149.38	<ul style="list-style-type: none"> • Protein and fat content of <i>lawar vegan</i> was the lowest one. • Carbohydrate of <i>lawar vegan</i> was higer than beef <i>lawar</i>, but lower than pork <i>lawar</i>
	<i>Beef Lawar (8)</i>	11.14	18.0	6.61	233	
	<i>Pork Lawar babi</i>	5.74	13.87	11.97	195,67	
3	<i>Vegan Betutu</i>	14.6	13.8	9.43	220.12	<ul style="list-style-type: none"> • Protein of <i>betutu vegan</i>

	Chicken <i>Betutu</i> (6)	20.6	7.82	4.54	170.98	<ul style="list-style-type: none"> was lower than <i>betutu</i> Fat, Carbohydrate, and calories of <i>betutu</i> vegan was higher than chicken <i>betutu</i>
4	Vegan <i>urutan</i>	6.58	33.89	21.56	417.59	<ul style="list-style-type: none"> Protein of vegan <i>urutan</i> was lower than beef <i>urutan daging</i>
	Beef <i>Urutan</i> (6)	25.66	27.8	1.99	361.53	<ul style="list-style-type: none"> Fat, Carbohydrate, and calories of vegan <i>urutan</i> was higher than beef <i>urutan</i>.
5	Vegan <i>Tum</i> <i>vegan</i>	7.75	12.97	24.6	246.07	<ul style="list-style-type: none"> Protein of vegan <i>tum</i> was lower than beef <i>tum</i>
	Beef <i>Tum</i> (6)	18.25	11.09	4.64	191.37	<ul style="list-style-type: none"> Fat, Carbohydrate, and calories of <i>vegan tum</i> was higher than beef <i>tum</i>
6	Vegan <i>satai</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> Protein of <i>vegan satai</i> was lower than <i>languan</i> (fish) <i>satai</i>
	<i>Languan</i> (fish) <i>satai</i> (6)	12.50	14.30	12.87	230.18	<ul style="list-style-type: none"> Carbohydrate of <i>vegan satai</i> was higher than <i>languan</i> (fish) <i>satai</i>

According to the data in Table 3, By and large, traditional Balinese foods made with vegetables have a higher calorie content than those made with animal products. It is not certain that meatless and animal-free dishes contain fewer carbs, proteins, fats, or calories. It is material dependent. As with vegan food processed with plant-based materials (gluten), these ingredients are also high in carbohydrates due to their origin in starchy flour.

Additionally, the method of cooking has an effect on the nutritional value of the food. Calorie content of foods can be increased by processing them with oil or by frying them. It is impossible to determine which food is superior based on the data above; it all depends on consumer preferences. The nutritional content information can be used to assist the community in making food selections.

4. Conclusions

Balinese traditional plant-based foods, such as *satai lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *satai*, and *urutan*, which is made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

Acknowledgements

The author would like to thank the Bali Tourism Polytechnic (Politeknik Pariwisata Bali) especially the Research and Community Service Unit (P3M PPB) which has provided research funding assistance.

Author Contributions

For this research, Ni Putu Eka Trisdayanti in the idea, writing, and coordinating all research processes. For AA. Gd. KP. Dalem and Made Purwa Dana Atmaja contributed to the survey activities in the field.

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Recommendation: Revisions Required



A NOVEL VEGETARIAN FOOD BASED ON BALINESE TRADITIONAL FOODS : Variety, Processing, and Nutrition

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Abstract

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch into plant-based foods. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. With these issues in mind, and in order to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. Sample of Balinese traditional plant-based foods was analyzed for its nutritional content. The data was analyzed using descriptive qualitative method. The Balinese traditional plant-based foods that found in Ubud were *satai lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *satai*, and *urutan*; which is made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

Article History

Received xxxxxx

Accepted xxxxxx

Keyword

Balinese traditional
plant-based foods,
Variety, Processing,
Nutrition

1. Introduction

Plant-based eating preference that emphasize fruits, vegetables, whole grains, legumes, nuts, and seeds is known as vegetarian diets. These diets are frequently thought to be meatless and animal free. There are many types of vegetarian diets, the most common of which are semi-vegetarian, pescatarian, and vegan. Given the severity of the risk of disease due to eating meat, many people turn to a vegetarian diet, which is considered to be more secure for the body's health. Vegetarian is a term for people who only eat plants and do not eat foods derived from living things such as meat and poultry, but still may eat seafood such as fish, or processed animal products such as eggs, cheese, milk(1). The reasons for adopting certain eating preference vary, and include ethical considerations, religious convictions, environmental and cultural concerns, as well as health-related considerations. (2,3). According to the American Dietetic Association (ADA), over 4.9 million (2.3%) adults in America turned vegetarian in 2006, and approximately 1.4% went vegan, while approximately 900 adults in Canada became vegetarian (4). The result of a survey by the Vegetarian Resource Group (VRG) in 2016 showed that approximately 3,7 million Americans are vegan and 4.3 million Americans are vegetarian but not vegans (5) In Indonesia, the number

of vegetarians registered in the Indonesia Vegetarian Society (IVS) increase significantly. In 1998, the number of registered vegetarians was around five thousands, and it has increased to sixty thousands registered members in 2007.(6).

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch into plant-based foods. Moreover, Balinese traditional foods, which are generally made from meat with its special spices, are very difficult to replace. Majority of vegetarian stalls, which sell Chinese vegetarian cuisine, are not necessarily accepted by the Balinese in particular. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. Moreover, due to religious belief, many visitors are not allowed to eat pork or beef.

With these issues in mind, and in order to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. These vegetarian cuisines are prepared using vegetables and a touch of Balinese culinary arts such as Balinese spices (*base genep*), with the end result resembling Balinese cuisine. The presence of these stalls can meet all of the community's and tourists' needs.

In our preliminary survey, we found that there is a type of vegetarian cuisine, namely *Tum* that is processed from an analogue meat made of high protein legums such as soybeans, mungbeans, etc. combine with Balinese spices. This analogue meat looks and tastes similar to *Tum* from meat. In addition, there are several forms of Balinese traditional plant-based meals available at vegetarian stalls throughout Bali. As a start, the research was undertaken in Gianyar Regency, specifically in Ubud, where the Ubud area has been declared as an International Gastronomic Destination by the UNWTO.

In order to establish a baseline nutritional data on some of the most popular vegetable-based traditional Balinese foods, it is important to conduct nutritional analysis. Therefore, the aim of this study was to establish the nutritional content of traditional Balinese plant-based foods and compare them to the nutritional value of Balinese meat-based cuisines. Additionally, the authors also conducted a survey on the types or varieties of Balinese vegetarian foods sold in the Ubud area, including the ingredients used and ~~their processing~~ their processing techniques.

2. Materials and Methods

We conducted interviews and observations at all vegetarian food stalls selling traditional Balinese vegetable dishes in Ubud Gianyar area. The information gathered included the types of vegetarian foods sold at each stall and their processing techniques. The nutritional content (carbohydrates, moisture, protein, fat, and calorie content) was then analysed using standard methods. Data were analysed using quantitative and qualitative approach. The findings from this study were compared to those of previous studies on Balinese specialties (animal-based).

3. Results and discussion





3.1. Types of Balinese traditional plant-based foods in Ubud Gianyar

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Table 1 summarizes the types and varieties of Balinese traditional plant-based foods that were sold in the Ubud Gianyar area. In total, there were eleven types of plant-based Balinese traditional foods found in the study area. These include *sate lilit* made from jackfruit meat, *lawar* made from stringbeans, *tum* and *urutan* made from analogue meats, *betutu* and *sisit* made from gluten, *dendeng* made from mungbeans, sayur urap, kuah kare, and Balinese soup, all made from vegetables. The processing methods and materials used for these plant-based foods are shown in Table 2. The main ingredients for these dishes comes from leafy vegetables, beans, coconut milk, jackfruit meat, papaya, mungbean, stringbean, gluten, and analogue meat.

Table 1. Types of Balinese traditional plant-based foods in Ubud Gianyar

No	Types of Balinese traditional plant-based foods	Picture
1	Sate lilit vegan	
2.	Sayur urap	
3.	Kuah kare	
4.	Balinese soup	

5. *Lawar*



6. *Tum*



7. *Betutu*



8. *Dendeng/ati*



9. *Sisit*



10. *Sate tusuk*



11. *Urutan*



Tabel 2. Balinese traditional plant-based Food Processing Method

No	Type of Balinese traditional plant-based Food	Processing Method
1.	<i>Sate lilit</i>	Young jackfruit meat was boiled, mashed, and combined with mixture of mung beans, <i>base genep</i> , grated coconut, tapioca flour, salt, pepper, brown sugar, and coriander. This mixture was formed into dough, shaped, wrapped, and deep fried.
2.	<i>Sayur urap</i>	Vegetables (spinach, sprouts, string beans) were cleaned, boiled and drained. The boiled vegetables were added and mixed with grated coconut, <i>sambal embe</i> , fried onions, and limes.
3.	<i>Kuah kare</i>	Vegetables (pumpkin, string beans, and carrots) were cleaned and cooked with spices, coconut milk, then sprinkled with fried onions.
4.	Balinese soup	Vegetables (pumpkin, string beans, carrots, spinach, and corn) were cleaned and cooked with spices, then sprinkled with fried onions.
5.	<i>Lawar</i>	String beans were cleaned and boiled until cooked (not mushy), then cut into short pieces. Papaya were cleaned, peeled and cut into matchstick size, then sprinkle with salt. The matchstick papaya were boiled until cooked (not mushy), drain and squeeze. The analogue meat was used to replace the beef. The analogue meat were cleaned, cooked, drained, and coarsely chopped. Cut the small haisom (hysom imitation) lengthwise. The analogue meat were mixed with grated coconut, then the <i>base selem</i> and <i>sambal embe</i> were added into the mixture. The mixture was seasoned with salt and lemon juice, squeezed, and mixed well. String beans were added then stirred until thoroughly blended.
6.	<i>Tum</i>	<i>Base genep</i> was boiled into coconut milk to make <i>Kalasan</i> coconut milk, then mixed with boiled and chopped analogue meat and pulverized <i>kluwek</i> . The mixture were added with fried onion sauce, fried onions, salt, seasonings. The mixture was wrapped in banana leaves and steamed for 45 minutes.
7.	<i>Betutu</i>	Gluten dough was cut and shredded. The shredded gluten dough was mixed with spices and salt. The mixture was wrapped with banana leaf and steamed for 30 minutes.
8.	<i>Dendeng/ati</i>	Mung beans were soaked for a day and drained, then added with coriander, salt. The mixture were steamed and cooled. The cooled mixture was thinly sliced and added with pulverized garlic, shallots, chilies, tomatoes, candlenuts, brown sugar which already sautéed with water until cooked.

9. <i>Sisit</i>	Gluten dough was boiled, added with soy sauce, stirred, let stand for a while then baked. This dish can be served with <i>sambal matah</i> .
10. <i>Sate tusuk</i>	Vegetable protein comes from soybean scalded with hot water and drained. The blended garlic, coriander, candlenut, chili, brown sugar, and salt were first stir-fried, then water and vegetable protein were added, and cooked to dry. The seasoned vegetable protein was skewered and grilled. Peanut sauce (fried peanuts were blended, boiled until thickened and added with soy sauce, fried onions and lime) was used as dipping sauce.
11. <i>Urutan</i>	<i>Base genep</i> sauteed until cooked, mixed with meat analogue that has been doused in hot water, and added with 1 tablespoon of wheat flour and 1 tablespoon of tapioca flour. The dough was placed on top of the beancurd, rolled, steamed, and fried briefly.

Several vegetarian stalls and restaurants in Ubud Bali already made an innovation by produce Balinese traditional plant-based Food. Vegetarian cuisine prepared with vegetable products and infused with Balinese culinary arts such as Balinese spices (base genep), with the end result resembling Balinese meal. The existence of these stalls and restaurants can complement all the needs of the community and tourists.

Animal-based ingredients in traditional Balinese foods can be replaced with vegetable-based ingredients, such as meat analogue and plant-based flavorings. The flavoring used include plant-based materials such as coriander, mushroom, peppers, etc. Meat analogue is a food ingredient whose shape, texture, and taste are very similar to meat, but it does not contain animal products at all. Usually, meat analogue are made from mushrooms, tempeh, tofu, and jackfruit meat. Some of the most common plant-based ingredients used in plant-based Balinese traditional foods include:

- a. Proteina known in the market by the trademark Proteina. Proteina contains vegetable protein from pure soybeans, that have been separated from the oil, without the addition of other ingredients.
- b. Haisom is a vegetable-based product that contains vegetable protein, mushrooms, wheat, vegetable spices. The cooking method is quite easy, namely by sautéing, to mix in capjay, or cooked in vegetarian oyster sauce.
- c. Gluten can be used for vegetarian and vegan dishes. Gluten is an amorphous (irregular form) of protein found in the endosperm (and also flour made from it) of certain cereals, most notably wheat, rye, and barley. Wheat contains the most gluten of the three. Gluten can account for up to 80% of total protein in flour and is composed of gliadin and glutenin proteins. Gluten is used to make dough chewy and expands (7). **Gluten can be made by vegetarian food processors themselves and can be purchased in the market. ~~It~~ Gluten can be made by kneading wheat flour with water to form a sticky dough strand. The dough is then rinsed with water while being slowly kneaded to remove the starch while continuing to knead slowly to remove the starch in it.** After rinsing, the remaining product is pure gluten with a chewy and sticky texture. To make it more practical, the vegetarian food cook said that ~~they~~ often buy artificial meat in the online or offline market (proteina, haisom, and gluten).

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Tum is traditionally produce using fresh blood as dye. In production of vegan *tum*, fresh blood is substituted using *kluwek*. *Kluwek* fruit meat has the potential to be used as medicine and herbs (8). However, before it is used as food ingredients, *kluwek* must be sliced and soaked in water to remove undesirable compounds such as cyanide, a toxic substance that can be harmful to the body.

3.2. Nutritional Content of Balinese traditional plant-based Food

Nutritional contents of Balinese traditional plant-based foods are shown in Table 3.

Tabel 3. Nutritional Content of Balinese Traditional Plant-Based Foods

No	Type of Balinese Vegetarian Food	Nutrient Content					
		Water content (%bb)	Ash Content (%bb)	Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)
1.	<i>Sayur Urab Vegan</i>	83.07	1.33	2.61	6.51	6.48	94.93
2.	<i>Balinese Soup Vegan</i>	88.70	1.24	3.21	1.94	4.90	49.93
3.	<i>Kare Vegan</i>	81.28	1.28	6.09	5.20	6.14	95.78
4.	<i>Sate Tusuk Vegan</i>	60.44	2.37	11.75	10.69	14.76	202.23
5.	<i>Tum Vegan</i>	53.31	1.38	7.75	12.97	24.6	246.07
6.	<i>Sate Lilit Vegan</i>	37.74	2.43	5.17	26.69	27.97	372.76
7.	<i>Lawar Vegan</i>	75.25	1.10	2.67	10.95	10.03	149.38
8.	<i>Ati vegan</i>	8.45	3.52	14.47	32.71	40.84	515.68
9.	<i>Sisit Vegan</i>	50.65	1.77	20.05	10.24	17.28	241.48
10.	<i>Betutu Vegan</i>	60.72	1.47	14.6	13.8	9.43	220.12
11.	<i>Urutan Vegan</i>	35.1	2.88	6.58	33.89	21.56	417.59

The results of nutritional value of Balinese traditional plant-based foods was compared with other studies of Balinese specialties (animal-based).

Tabel 4. Comparison of the Nutrient Content of Balinese traditional plant-based Foods with Balinese traditional animal-based Foods. You can first calculate the caloric value of the animal-based product → compare it with the caloric value of the plant-based product

Food	Nutrient Content				Comparison Results
	Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)	
1 <i>Vegan satai lilit</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> Protein content of <i>sate lilit vegan</i> was higher than <i>sate lilit</i> from beef, but lower than <i>pork satai lilit babi</i>
<i>Beef satai lilit (9)</i>	5.74	23.29	24.89	332.13	
<i>Pork satai lilit—babi</i>	27,02	2,93	15,64	197,01	

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(10)						<ul style="list-style-type: none"> • Fat content of <i>sate lilit vegan</i> was higher than <i>pork satai lilit</i>, but lower than beef <i>satai lilit</i> • Carbohydrate content of <i>sate lilit vegan</i> lowest compared with beef <i>satai lilit</i> and pork <i>satai lilit</i>
2	Vegan Lawar	2.67	10.95	10.03	149.38	<ul style="list-style-type: none"> • Protein and fat content of <i>lawar vegan</i> was the lowest one. • Carbohydrate of <i>lawar vegan</i> was higher than beef <i>lawar</i>, but lower than pork <i>lawar</i>
	Beef Lawar (11)	11.14	18.0	6.61	233	
	Pork Lawar babi	5.74	13.87	11.97	195,67	
3	Vegan Betutu	14.6	13.8	9.43	220.12	<ul style="list-style-type: none"> • Protein of <i>betutu vegan</i> was lower than <i>betutu</i> • Fat, Carbohydrate, and calories of <i>betutu vegan</i> was higher than chicken <i>betutu</i>
	Chicken Betutu(9)	20.6	7.82	4.54	170.98	
4	Vegan urutan	6.58	33.89	21.56	417.59	<ul style="list-style-type: none"> • Protein of <i>vegan urutan</i> was lower than beef <i>urutan daging</i> • Fat, Carbohydrate, and calories of <i>vegan urutan</i> was higher than beef <i>urutan</i>.
	Beef Urutan (9)	25.66	27.8	1.99	361.53	
5	Vegan Tum vegan	7.75	12.97	24.6	246.07	<ul style="list-style-type: none"> • Protein of <i>vegan tum</i> was lower than beef <i>tum</i> • Fat, Carbohydrate, and calories of <i>vegan tum</i> was higher than beef <i>tum</i>
	Beef Tum (9)	18.25	11.09	4.64	191.37	
6	Vegan satai	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> • Protein of <i>vegan</i>

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<i>Languan</i> (fish) <i>satai</i> (9)	12.50	14.30	12.87	230.18	<i>satai</i> was lower than <i>languan</i> (fish) <i>satai</i> • Carbohydrate of <i>vegan satai</i> was <i>higher than languan</i> (fish) <i>satai</i>
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According to the data in Table 3, By and large, traditional Balinese foods made with vegetables have a higher calorie content than those made with animal products. It is not certain that meatless and animal-free dishes contain fewer carbs, proteins, fats, or calories. It is material dependent. As with vegan food processed with plant-based materials (gluten), these ingredients are also high in carbohydrates due to their origin in starchy flour.

Additionally, the method of cooking has an effect on the nutritional value of the food. Calorie content of foods can be increased by processing them with oil or by frying them. It is impossible to determine which food is superior based on the data above; it all depends on consumer preferences. The nutritional content information can be used to assist the community in making food selections.

4. Conclusions

Balinese traditional plant-based foods, such as *satai lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *satai*, and *urutan*, which is made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

Acknowledgements

The author would like to thank the Bali Tourism Polytechnic (Politeknik Pariwisata Bali) especially the Research and Community Service Unit (P3M PPB) which has provided research funding assistance.

Author Contributions

For this research, Ni Putu Eka Trisdayanti in the idea, writing, and coordinating all research processes. For AA. Gd. KP. Dalem and Made Purwa Dana Atmaja contributed to the survey activities in the field.

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A NOVEL VEGETARIAN FOOD BASED ON BALINESE TRADITIONAL FOODS : Variety, Processing, and Nutrition

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Abstract

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch into plant-based foods. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. With these issues in mind, and in order to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. Sample of Balinese traditional plant-based foods was analyzed for its nutritional content. The data was analyzed using descriptive qualitative method. The Balinese traditional plant-based foods that found in Ubud were *satai lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *satai*, and *urutan*; which is made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

Article History

Received xxxxxx

Accepted xxxxxx

Keyword

Balinese traditional plant-based foods, Variety, Processing, Nutrition

1. Introduction

Plant-based eating preference that emphasize fruits, vegetables, whole grains, legumes, nuts, and seeds is known as vegetarian diets. These diets are frequently thought to be meatless and animal free. There are many types of vegetarian diets, the most common of which are semi-vegetarian, pescatarian, and vegan. Given the severity of the risk of disease due to eating meat, many people turn to a vegetarian diet, which is considered to be more secure for the body's health. Vegetarian is a term for people who only eat plants and do not eat foods derived from living things such as meat and poultry, but still may eat seafood such as fish, or processed animal products such as eggs, cheese, milk(1). The reasons for adopting certain eating preference vary, and include ethical considerations, religious convictions, environmental and cultural concerns, as well as health-related considerations. (2,3). According to the American Dietetic Association (ADA), over 4.9 million (2.3%) adults in America turned vegetarian in 2006, and approximately 1.4% went vegan, while approximately 900 adults in Canada became vegetarian (4). The result of a survey by the Vegetarian Resource Group (VRG) in 2016 showed that approximately 3,7 million Americans are vegan and 4.3 million Americans are vegetarian but not vegans (5).

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We recommend that you display the latest data regarding the number of vegetarians in America). In Indonesia, the number of vegetarians registered in the Indonesia Vegetarian Society (IVS) increase significantly. In 1998, the number of registered vegetarians was around five thousands, and it has increased to sixty thousands registered members in 2007.(6).

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch into plant-based foods. Moreover, Balinese traditional foods, which are generally made from meat with its special spices, are very difficult to replace. Majority of vegetarian stalls, which sell Chinese vegetarian cuisine, are not necessarily accepted by the Balinese in particular. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. Moreover, due to religious belief, many visitors are not allowed to eat pork or beef.

With these issues in mind, and in order to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. These vegetarian cuisines are prepared using vegetables and a touch of Balinese culinary arts such as Balinese spices (*base genep*), with the end result resembling Balinese cuisine. The presence of these stalls can meet all of the community's and tourists' needs.

In our preliminary survey, we found that there is a type of vegetarian cuisine, namely *Tum* that is processed from an analogue meat made of high protein legums such us soybeans, mungbeans, etc. combine with Balinese spices. This analogue meat looks and tastes similar to *Tum* from meat. In addition, there are several forms of Balinese traditional plant-based meals available at vegetarian stalls throughout Bali. As a start, the research was undertaken in Gianyar Regency, specifically in Ubud, where the Ubud area has been declared as an International Gastronomic Destination by the UNWTO.

In order to established a baseline nutritional data on some of the most popular vegetable-based traditional Balinese foods, it is important to conduct nutritional analysis. Therefore, the aim of this study was to establish the nutritional content of traditional Balinese plant-based foods and compare them to the nutritional value of Balinese meat-based cuisines. Additionally, the authors also conducted a survey on the types or varieties of Balinese vegetarian foods sold in the Ubud area, including the ingredients used and ~~their~~ processing techniques.

2. Materials and Methods

We conducted interviews and observations at all vegetarian food stalls selling traditional Balinese vegetable dishes in Ubud Gianyar area. The information gathered included the types of vegetarian foods sold at each stall and their processing techniques. The nutritional content (carbohydrates, moisture, protein, fat, and calorie content) was then analysed using standard methods. Data were analysed using quantitative and qualitative approach. The findings from this study were compared to those of previous studies on Balinese specialties (animal-based).

3. Results and discussion

3.1. Types of Balinese traditional plant-based foods in Ubud Gianyar

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Table 1 summarizes the types and varieties of Balinese traditional plant-based foods that were sold in the Ubud Gianyar area. In total, there were eleven types of plant-based Balinese traditional foods found in the study area. These include *sate lilit* made from jackfruit meat, *lawar* made from stringbeans, *tum* and *urutan* made from analogue meats, *betutu* and *sisit* made from gluten, *dendeng* made from mungbeans, sayur urap, kuah kare, and Balinese soup, all made from vegetables.

The processing methods and materials used for these plant-based foods are shown in Table 2. The main ingredients for these dishes comes from leafy vegetables, beans, coconut milk, jackfruit meat, papaya, mungbean, stringbean, gluten, and analogue meat.

Table 1. Types of Balinese traditional plant-based foods in Ubud Gianyar

No	Types of Balinese traditional plant-based foods	Picture
1	Sate lilit vegan	
2.	Sayur urap	
3.	Kuah kare	
4.	Balinese soup	

5. *Lawar*



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6. *Tum*



7. *Betutu*



8. *Dendeng/ati*



9. *Sisit*



10. *Sate tusuk*



11. *Urutan*



Tabel 2. Balinese traditional plant-based Food Processing Method

No	Type of Balinese traditional plant-based Food	Processing Method
1.	<i>Sate lilit</i>	Young jackfruit meat was boiled, mashed, and combined with mixture of mung beans, <i>base genep</i> , grated coconut, tapioca flour, salt, pepper, brown sugar, and coriander. This mixture was formed into dough, shaped, wrapped, and deep fried.
2.	<i>Sayur urap</i>	Vegetables (spinach, sprouts, string beans) were cleaned, boiled and drained. The boiled vegetables were added and mixed with grated coconut, <i>sambal embe</i> , fried onions, and limes.
3.	<i>Kuah kare</i>	Vegetables (pumpkin, string beans, and carrots) were cleaned and cooked with spices, coconut milk, then sprinkled with fried onions.
4.	Balinese soup	Vegetables (pumpkin, string beans, carrots, spinach, and corn) were cleaned and cooked with spices, then sprinkled with fried onions.
5.	<i>Lawar</i>	String beans were cleaned and boiled until cooked (not mushy), then cut into short pieces. Papaya were cleaned, peeled and cut into matchstick size, then sprinkle with salt. The matchstick papaya were boiled until cooked (not mushy), drain and squeeze. The analogue meat was used to replace the beef. The analogue meat were cleaned, cooked, drained, and coarsely chopped. Cut the small haisom (hysom imitation) lengthwise. The analogue meat were mixed with grated coconut, then the <i>base selem</i> and <i>sambal embe</i> were added into the mixture. The mixture was seasoned with salt and lemon juice, squeezed, and mixed well. String beans were added then stirred until thoroughly blended.
6.	<i>Tum</i>	<i>Base genep</i> was boiled into coconut milk to make <i>Kalasan</i> coconut milk, then mixed with boiled and chopped analogue meat and pulverized <i>kluwek</i> . The mixture were added with fried onion sauce, fried onions, salt, seasonings. The mixture was wrapped in banana leaves and steamed for 45 minutes.
7.	<i>Betutu</i>	Gluten dough was cut and shredded. The shredded gluten dough was mixed with spices and salt. The mixture was wrapped with banana leaf and steamed for 30 minutes.
8.	<i>Dendeng/ati</i>	Mung beans were soaked for a day and drained, then added with coriander, salt. The mixture were steamed and cooled. The cooled mixture was thinly sliced and added with pulverized garlic, shallots, chilies, tomatoes, candlenuts, brown sugar which already sautéed with water until cooked.

9. <i>Sisit</i>	Gluten dough was boiled, added with soy sauce, stirred, let stand for a while then baked. This dish can be served with <i>sambal matah</i> .
10. <i>Sate tusuk</i>	Vegetable protein comes from soybean scalded with hot water and drained. The blended garlic, coriander, candlenut, chili, brown sugar, and salt were first stir-fried, then water and vegetable protein were added, and cooked to dry. The seasoned vegetable protein was skewered and grilled. Peanut sauce (fried peanuts were blended, boiled until thickened and added with soy sauce, fried onions and lime) was used as dipping sauce.
11. <i>Urutan</i>	<i>Base genep</i> sauteed until cooked, mixed with meat analogue that has been doused in hot water, and added with 1 tablespoon of wheat flour and 1 tablespoon of tapioca flour. The dough was placed the on top of the beancurd, rolled, steamed, and fried briefly.

Several vegetarian stalls and restaurants in Ubud Bali already made an innovation by produce Balinese traditional plant-based Food. Vegetarian cuisine prepared with vegetable products and infused with Balinese culinary arts such as Balinese spices (base genep), with the end result resembling Balinese meal. The existence of these stalls and restaurants can complement all the needs of the community and tourists.

Animal-based ingredients in traditional Balinese foods can be replaced with vegetable-based ingredients, such as meat analogue and plant-based flavorings. The flavoring used include plant-based materials such as coriander, mushroom, peppers, etc. Meat analogue is a food ingredient whose shape, texture, and taste are very similar to meat, but it does not contain animal products at all. Usually, meat analogue are made from mushrooms, tempeh, tofu, and jackfruit meat. Some of the most common plant-based ingredients used in plant-based Balinese traditional foods include:

- a. Proteina known in the market by the trademark Proteina. Proteina contains vegetable protein from pure soybeans, that have been separated from the oil, without the addition of other ingredients.
- b. Haisom is a vegetable-based product that contains vegetable protein, mushrooms, wheat, vegetable spices. The cooking method is quite easy, namely by sautéing, to mix in capjay, or cooked in vegetarian oyster sauce.

Gluten can be used for vegetarian and vegan dishes. Gluten is an amorphous (irregular form) of protein found in the endosperm (and also flour made from it) of certain cereals, most notably wheat, rye, and barley. Wheat contains the most gluten of the three. Gluten can account for up to 80% of total protein in flour and is composed of gliadin and glutenin proteins. Gluten is used to make dough chewy and expands (7). ~~Gluten can be made by vegetarian food processors themselves and can be purchased in the market. ~~It can be made by kneading wheat flour with water to form a sticky dough strand. The dough is then rinsed with water while being slowly kneaded to remove the starch while continuing to knead slowly to remove the starch in it. After rinsing, the remaining product is pure gluten with a chewy and sticky texture. To make it more practical, the vegetarian food cook said that they often buy artificial meat in the online or offline market (proteina, haisom, and gluten).~~~~

- c. To make it more practical, the vegetarian food cook said that they often buy artificial meat or gluten in online or offline markets. Artificial meat available in the market is

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not only made from wheat flour but can also be made from pure soybeans, what they usually use is a product with the Proteina brand. In addition, vegetarian cooks often use haisom/sea cucumber which are sold under various trademarks.

Tum is traditionally produce using fresh blood as dye. In production of vegan *tum*, fresh blood is substituted using *kluwek*. *Kluwek* fruit meat has the potential to be used as medicine and herbs (8). However, before it is used as food ingredients, *kluwek* must be sliced and soaked in water to remove undesirable compounds such us cyanide, a toxic substance that can be harmful to the body.

3.2. Nutritional Content of Balinese traditional plant-based Food

Nutritional contents of Balinese traditional plant-based foods are shown in Table 3.

Table 3. Nutritional Content of Balinese Traditional Plant-Based Foods

No	Type of Balinese Vegetarian Food	Nutrient Content					
		Water content (%bb)	Ash Content (%bb)	Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)
1.	<i>Sayur Urab Vegan</i>	83.07	1.33	2.61	6.51	6.48	94.93
2.	<i>Balinese Soup Vegan</i>	88.70	1.24	3.21	1.94	4.90	49.93
3.	<i>Kare Vegan</i>	81.28	1.28	6.09	5.20	6.14	95.78
4.	<i>Sate Tusuk Vegan</i>	60.44	2.37	11.75	10.69	14.76	202.23
5.	<i>Tum Vegan</i>	53.31	1.38	7.75	12.97	24.6	246.07
6.	<i>Sate Lilit Vegan</i>	37.74	2.43	5.17	26.69	27.97	372.76
7.	<i>Lawar Vegan</i>	75.25	1.10	2.67	10.95	10.03	149.38
8.	<i>Ati vegan</i>	8.45	3.52	14.47	32.71	40.84	515.68
9.	<i>Sisit Vegan</i>	50.65	1.77	20.05	10.24	17.28	241.48
10.	<i>Betutu Vegan</i>	60.72	1.47	14.6	13.8	9.43	220.12
11.	<i>Urutan Vegan</i>	35.1	2.88	6.58	33.89	21.56	417.59

The results of nutritional value of Balinese traditional plant-based foods was compared with other studies of Balinese specialties (animal-based).

Table 4. Comparison of the Nutrient Content of Balinese traditional plant-based Foods with Balinese traditional animal-based Foods.

. No	Type of Food	Nutrient Content				Comparison Results
		Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)	
1	<i>Vegan satai lilit</i>	11.75	10.69	14.76	202.23	• Protein content of <i>sate lilit vegan</i>
	<i>Beef satai</i>	5.74	23.29	24.89	332.13	

	<i>lilit</i> (9)								was higher than <i>sate lilit</i> from beef, but lower than <i>pork satai lilit babi</i>
	<i>Pork satai lilit babi</i> (10)	27,02	2,93	15,64	197,01				<ul style="list-style-type: none"> • Fat <u>and calories</u> content of <i>sate lilit vegan</i> was higher than <i>pork satai lilit</i>, but lower than beef <i>satai lilit</i> • Carbohydrate content of <i>sate lilit vegan</i> lowest compared with beef <i>satai lilit</i> and <i>pork satai lilit</i>
2	<i>Vegan Lawar</i>	2.67	10.95	10.03	149.38				<ul style="list-style-type: none"> • Protein, <u>and fat and calories</u> content of <i>lawar vegan</i> was the lowest one.
	<i>Beef Lawar</i> (11)	11.14	18.0	6.61	233				<ul style="list-style-type: none"> • Carbohydrate of <i>lawar vegan</i> was higer than beef <i>lawar</i>, but lower than <i>pork lawar</i>
	<i>Pork Lawar babi</i>	5.74	13.87	11.97	195,67				
3	<i>Vegan Betutu</i>	14.6	13.8	9.43	220.12				<ul style="list-style-type: none"> • Protein of <i>betutu vegan</i> was lower than <i>betutu</i>
	<i>Chicken Betutu</i> (9)	20.6	7.82	4.54	170.98				<ul style="list-style-type: none"> • Fat, Carbohydrate, and calories of <i>betutu vegan</i> was higher than chicken <i>betutu</i>
4	<i>Vegan urutan</i>	6.58	33.89	21.56	417.59				<ul style="list-style-type: none"> • Protein of <i>vegan urutan</i> was lower than beef <i>urutan daging</i>
	<i>Beef Urutan</i> (9)	25.66	27.8	1.99	361.53				<ul style="list-style-type: none"> • Fat, Carbohydrate, and calories of <i>vegan urutan</i> was higher than beef

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						<i>urutan.</i>
5	Vegan <i>Tum</i> <i>vegan</i>	7.75	12.97	24.6	246.07	<ul style="list-style-type: none"> • Protein of <i>vegan tum</i> was lower than <i>beef tum</i>
	Beef <i>Tum</i> (9)	18.25	11.09	4.64	191.37	<ul style="list-style-type: none"> • Fat, Carbohydrate, and calories of <i>vegan tum</i> was higher than <i>beef tum</i>
6	Vegan <i>satai</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> • Protein of <i>vegan satai</i> was lower than <i>languan</i> (fish) <i>satai</i>
	<i>Languan</i> (fish) <i>satai</i> (9)	12.50	14.30	12.87	230.18	<ul style="list-style-type: none"> • Carbohydrate of <i>vegan satai</i> was higher than <i>languan</i> (fish) <i>satai</i>

According to the data in Table 3, By and large, traditional Balinese foods made with vegetables have a higher calorie content than those made with animal products. It is not certain that meatless and animal-free dishes contain fewer carbs, proteins, fats, or calories. It is material dependent. As with vegan food processed with plant-based materials (gluten), these ingredients are also high in carbohydrates due to their origin in starchy flour.

Additionally, the method of cooking has an effect on the nutritional value of the food. Calorie content of foods can be increased by processing them with oil or by frying them. It is impossible to determine which food is superior based on the data above; it all depends on consumer preferences. The nutritional content information can be used to assist the community in making food selections.

4. Conclusions

Balinese traditional plant-based foods, such as *satai lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *satai*, and *urutan*, which is made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

Acknowledgements

The author would like to thank the Bali Tourism Polytechnic (Politeknik Pariwisata Bali) especially the Research and Community Service Unit (P3M PPB) which has provided research funding assistance.

Author Contributions

For this research, Ni Putu Eka Trisdayanti in the idea, writing, and coordinating all research processes. For AA. Gd. KP. Dalem and Made Purwa Dana Atmaja contributed to the survey activities in the field.

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A NOVEL VEGETARIAN FOOD BASED ON BALINESE TRADITIONAL FOODS: Variety, Processing, and Nutrition

Ni Putu Eka Trisdayanti¹, AA. Gd. Putra KP. Dalem² and Made Purwa Dana Atmaja³

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Abstract

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch to plant-based foods. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. With these issues in mind, and to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. The sample of Balinese traditional plant-based foods was analysed for their nutritional content. The data were analysed using the descriptive qualitative method. The Balinese traditional plant-based foods found in Ubud were *Sate Lilit*, *Kuah Kare*, Balinese soup, *Sayur Urap*, *Betutu*, *Lawar*, *Tum*, *Dendeng/Ati*, *Sisit*, *Sate*, and *Urutan*; which is made similar to Balinese food processing using Balinese spices (*Base Genep*) contains good nutrition.

Article History

Received xxxxxx

Accepted xxxxxx

Keyword

Balinese traditional
plant-based foods,
Variety, Processing,
Nutrition

1. Introduction

Plant-based eating preference, that emphasizes fruits, vegetables, whole grains, legumes, nuts, and seeds, is known as vegetarian diets. These diets are frequently thought to be meatless and animal-free. There are many types of vegetarian diets, the most common of which are semi-vegetarian, pescatarian, and vegan. (1). The reasons for adopting certain eating preferences vary and include ethical considerations, religious convictions, environmental and cultural concerns, as well as health-related considerations. (2,3). According to the American Dietetic Association (ADA), over 4.9 million (2.3%) adults in America turned vegetarian in 2006, and approximately 1.4% went vegan, while approximately 900 adults in Canada became vegetarian (4). The result of a survey by the Vegetarian Resource Group (VRG) in 2016 showed that approximately 3,7 million Americans are vegan, and 4.3 million Americans are vegetarian but not vegans (5). In Indonesia, the number of vegetarians registered in the Indonesia Vegetarian Society (IVS) increase significantly. In 1998, the number of registered vegetarians was around five thousands and it has increased to sixty thousands registered members in 2007. (6).

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch to plant-based foods. Moreover, Balinese traditional foods, which are generally made from meat with its special spices, are very difficult to replace. The majority of vegetarian stalls, which sell Chinese vegetarian cuisine, are not necessarily accepted by the Balinese in particular. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. Moreover, due to religious beliefs, many visitors are not allowed to eat pork or beef.

With these issues in mind, and to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. These vegetarian cuisines are prepared using vegetables and a touch of Balinese culinary arts such as Balinese spices (*Base Genep*), with the result resembling Balinese cuisine. The presence of these stalls can meet all of the community's and tourists' needs.

In our preliminary survey, we found that there is a type of vegetarian cuisine, namely *Tum* that is processed from analog meat made of high protein legumes such as soybeans, mungbeans, etc. combine with Balinese spices. This analog meat looks and tastes similar to *Tum* from meat. In addition, there are several forms of Balinese traditional

Plant-based meals available at vegetarian stalls throughout Bali. As a start, the research was undertaken in Gianyar Regency, specifically in Ubud, where the Ubud area has been declared an International Gastronomic Destination by the UNWTO.

To establish the baseline of nutritional data on some of the most popular vegetable-based traditional Balinese foods, it is important to conduct a nutritional analysis. Therefore, this study aimed to establish the nutritional content of traditional Balinese plant-based foods and compare them to the nutritional value of Balinese meat-based cuisines. Additionally, the authors also conducted a survey on the types or varieties of Balinese vegetarian foods sold in the Ubud area, including the ingredients used and their processing techniques.

2. Materials and Methods

The research was conducted through interviews and observations at all vegetarian food stalls selling traditional Balinese vegetable dishes in the Ubud Gianyar area. The information gathered included the types of vegetarian foods sold at each stall and their processing techniques. The nutritional content (carbohydrates, moisture, protein, fat, and calorie content) was then analyzed using standard methods. Data were analyzed using a quantitative and qualitative approach. The findings from this study were compared to those of previous studies on Balinese specialties (animal-based).






3. Results and discussion

3.1. Types of Balinese traditional plant-based foods in Ubud Gianyar

Table 1 summarizes the types and varieties of Balinese traditional plant-based foods that were sold in the Ubud Gianyar area. In total, there were eleven types of plant-based Balinese traditional foods found in the study area. These include *sate lilit* made from jackfruit meat, *lawar* made from string beans, *tum* and *urutan* made from analog meats, *betutu* and *sisit* made from gluten, *dendeng* made from mung beans, *sayur urap*, *kuah kare*, and Balinese soup, all made from vegetables.

The processing methods and materials used for these plant-based foods are shown in Table 2. The main ingredients for these dishes come from leafy vegetables, beans, coconut milk, jackfruit meat, papaya, mung bean, string bean, gluten, and analog meat.

Table 1. Types of Balinese traditional plant-based foods in Ubud Gianyar

No	Types of Balinese traditional plant-based foods	Picture
1	<i>Sate lilit</i> vegan	
2.	<i>Sayur urap</i>	
3.	<i>Kuah kare</i>	
4.	Balinese soup	
5.	<i>Lawar</i>	

6. *Tum*



7. *Betutu*



8. *Dendeng/ati*



9. *Sisit*



10. *Sate tusuk*



11. *Urutan*



Table 2. Balinese traditional plant-based Food Processing Method

No	Type of Balinese traditional plant-based Food	Processing Method
1.	<i>Sate lilit</i>	Young jackfruit meat was boiled, mashed, and combined with a mixture of mung beans, <i>base genep</i> , grated coconut, tapioca flour, salt, pepper, brown sugar, and coriander. This mixture was formed into a dough, shaped, wrapped, and deep-fried.
2.	<i>Sayur urap</i>	Vegetables (spinach, sprouts, string beans) were cleaned, boiled, and drained. The boiled vegetables were added and mixed with grated coconut, <i>sambel embe</i> , fried onions, and limes.
3.	<i>Kuah kare</i>	Vegetables (pumpkin, string beans, and carrots) were cleaned and cooked with spices, and coconut milk, then sprinkled with fried onions.
4.	Balinese soup	Vegetables (pumpkin, string beans, carrots, spinach, and corn) were cleaned and cooked with spices, then sprinkled with fried onions.
5.	<i>Lawar</i>	String beans were cleaned and boiled until cooked (not mushy), then cut into short pieces. Papaya was cleaned, peeled, and cut into matchstick-size, then sprinkle with salt. The matchstick papaya was boiled until cooked (not mushy), drained, and squeezed. The analog meat was used to replace the beef. The analog meat was cleaned, cooked, drained, and coarsely chopped. Cut the small haisom (hysom imitation) lengthwise. The analog meat was mixed with grated coconut, then the <i>base selem</i> and <i>sambal embe</i> were added to the mixture. The mixture was seasoned with salt and lemon juice, squeezed, and mixed well. String beans were added and then stirred until thoroughly blended.
6.	<i>Tum</i>	<i>Base genep</i> was boiled into coconut milk to make <i>Kalasan</i> coconut milk, then mixed with boiled and chopped analog meat and pulverized <i>kluwek</i> . The mixture was added with fried onion sauce, fried onions, salt, and seasonings. The mixture was wrapped in banana leaves and steamed for 45 minutes.
7.	<i>Betutu</i>	Gluten dough was cut and shredded. The shredded gluten dough was mixed with spices and salt. The mixture was wrapped with banana leaves and steamed for 30 minutes.
8.	<i>Dendeng/ati</i>	Mung beans were soaked for a day and drained, then added with coriander, and salt. The mixture was steamed and cooled. The cooled mixture was thinly sliced and added with pulverized garlic, shallots, chilies, tomatoes, candlenuts, and brown sugar which was already sautéed with water until cooked.
9.	<i>Sisit</i>	Gluten dough was boiled, added with soy sauce, stirred, let stand for a while then baked. This dish can be served with <i>sambal matah</i> .
10.	<i>Sate tusuk</i>	Vegetable protein comes from soybean scalded with hot water and drained. The blended garlic, coriander, candlenut, chili, brown sugar, and salt were first stir-fried, then water and vegetable protein were added, and cooked to dry. The seasoned vegetable protein was skewered and grilled. Peanut sauce

	(fried peanuts were blended, boiled until thickened, and added with soy sauce, fried onions, and lime) was used as a dipping sauce.
11. <i>Urutan</i>	<i>Base genep</i> sauteed until cooked, mixed with meat analog that has been doused in hot water, and added with 1 tablespoon of wheat flour and 1 tablespoon of tapioca flour. The dough was placed on top of the bean curd, rolled, steamed, and fried briefly.

Several vegetarian stalls and restaurants in Ubud Bali already made an innovation by producing Balinese traditional plant-based Food. Vegetarian cuisine is prepared with vegetable products and infused with Balinese culinary arts such as Balinese spices (*base genep*), with the result resembling a Balinese meal. The existence of these stalls and restaurants can complement all the needs of the community and tourists.

Animal-based ingredients in traditional Balinese foods can be replaced with vegetable-based ingredients, such as meat analogs and plant-based flavorings.

The flavoring used includes plant-based materials such as coriander, mushroom, peppers, etc. Meat analog is a food ingredient whose shape, texture, and taste are very similar to meat, but it does not contain animal products at all. Usually, meat analogs are made from mushrooms, tempeh, tofu, and jackfruit meat. Some of the most common plant-based ingredients used in plant-based Balinese traditional foods include:

- a. Proteina was known in the market by the trademark Proteina. Proteina contains vegetable protein from pure soybeans, that have been separated from the oil, without the addition of other ingredients.
- b. Haisom is a vegetable-based product that contains vegetable protein, mushrooms, wheat, and vegetable spices. The cooking method is quite easy, namely by sautéing, mixing in capjay, or cooking in vegetarian oyster sauce.
- c. Gluten can be used for vegetarian and vegan dishes. Gluten is an amorphous (irregular form) of protein found in the endosperm (and flour made from it) of certain cereals, most notably wheat, rye, and barley. Wheat contains the most gluten of the three. Gluten can account for up to 80% of the total protein in the flour and is composed of gliadin and glutenin proteins. Gluten is used to make dough chewy and expands (7). Gluten can be made by food processors themselves and can be purchased in the market. Gluten can be made by kneading wheat flour with water to form a sticky dough strand. The dough is then rinsed with water while being slowly kneaded to remove the starch. After rinsing, the remaining product is pure gluten with a chewy and sticky texture. To make it more practical, the vegetarian food cook said that they often buy artificial meat or gluten in online or offline markets. Artificial meat available in the market is not only made from wheat flour but can also be made from pure soybeans, what they usually use is a product with the Proteina brand. In addition, vegetarian cooks often use haisom/sea cucumber which is sold under various trademarks.

Tum is traditionally produced using fresh blood as the coloring. In the production of vegan *tum*, fresh blood is substituted using *kluwek*. *Kluwek* fruit meat has the potential to be used as medicine and herbs (8). However, before it is used as food ingredients, *kluwek* must be sliced and soaked in water to remove undesirable compounds such as cyanide, a toxic substance that can be harmful to the body.

3.2. Nutritional Content of Balinese traditional plant-based Food

The nutritional contents of Balinese traditional plant-based foods are shown in Table 3.

Table 3. Nutritional Content of Balinese Traditional Plant-Based Foods

No	Type of Balinese Vegetarian Food	Nutrient Content					
		Water content (%bb)	Ash Content (%bb)	Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)
1.	<i>Sayur Urab Vegan</i>	83.07	1.33	2.61	6.51	6.48	94.93
2.	<i>Balinese Soup Vegan</i>	88.70	1.24	3.21	1.94	4.90	49.93
3.	<i>Kare Vegan</i>	81.28	1.28	6.09	5.20	6.14	95.78
4.	<i>Sate Tusuk Vegan</i>	60.44	2.37	11.75	10.69	14.76	202.23
5.	<i>Tum Vegan</i>	53.31	1.38	7.75	12.97	24.6	246.07
6.	<i>Sate Lilit Vegan</i>	37.74	2.43	5.17	26.69	27.97	372.76
7.	<i>Lawar Vegan</i>	75.25	1.10	2.67	10.95	10.03	149.38
8.	<i>Ati vegan</i>	8.45	3.52	14.47	32.71	40.84	515.68
9.	<i>Sisit Vegan</i>	50.65	1.77	20.05	10.24	17.28	241.48
10.	<i>Betutu Vegan</i>	60.72	1.47	14.6	13.8	9.43	220.12
11.	<i>Urutan Vegan</i>	35.1	2.88	6.58	33.89	21.56	417.59

The results of the nutritional value of Balinese traditional plant-based foods were compared to other studies of Balinese specialties (animal-based).

Table 4. Comparison of the Nutrient Content of Balinese traditional plant-based Foods with Balinese traditional animal-based Foods.

No	Type of Food	Nutrient Content				Comparison Results
		Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)	
1	<i>Vegan sate lilit</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> The protein content of <i>sate lilit vegan</i> was higher than <i>sate lilit</i> from beef but lower than <i>pork sate lilit</i> Fat and calories content of <i>sate lilit vegan</i> was higher than <i>pork sate lilit</i>, but lower than beef <i>sate lilit</i> Carbohydrate content of <i>sate lilit vegan</i> lowest
	<i>Beef sate lilit (9)</i>	5.74	23.29	24.89	332.13	
	<i>Pork sate lilit (10)</i>	27,02	2,93	15,64	197.01	

						compared with beef sate <i>lilit</i> and pork sate <i>lilit</i>
2	<i>Vegan Lawar</i>	2.67	10.95	10.03	149.38	<ul style="list-style-type: none"> • Protein, fat, and calories content of <i>lawar</i> vegan was the lowest one. • Carbohydrate of <i>lawar</i> <i>vegan</i> was higher than beef <i>lawar</i> but lower than pork <i>lawar</i>
	<i>Beef Lawar</i> (11)	11.14	18.0	6.61	233	
	<i>Pork Lawar</i>	5.74	13.87	11.97	195,67	
3	<i>Vegan Betutu</i>	14.6	13.8	9.43	220.12	<ul style="list-style-type: none"> • The protein of <i>vegan betutu</i> was lower than <i>betutu</i> • Fat, Carbohydrate, and calories of <i>vegan betutu</i> were higher than chicken <i>betutu</i>
	Chicken <i>Betutu</i> (9)	20.6	7.82	4.54	170.98	
4	<i>Vegan urutan</i>	6.58	33.89	21.56	417.59	<ul style="list-style-type: none"> • The protein of <i>vegan urutan</i> was lower than beef <i>urutan</i> • Fat, carbohydrates, and calories of <i>vegan urutan</i> were higher than beef <i>urutan</i>.
	Beef <i>Urutan</i> (9)	25.66	27.8	1.99	361.53	
5	<i>Vegan Tum</i>	7.75	12.97	24.6	246.07	<ul style="list-style-type: none"> • The protein of <i>vegan tum</i> was lower than beef <i>tum</i> • Fat, Carbohydrate, and calories of <i>vegan tum</i> were higher than beef <i>tum</i>
	Beef <i>Tum</i> (9)	18.25	11.09	4.64	191.37	
6	<i>Vegan sate Languan</i> (fish) <i>sate</i> (9)	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> • The protein of <i>vegan sate</i> was lower than <i>languan</i> (fish) <i>sate</i> • The carbohydrate of <i>vegan sate</i> was higher than <i>languan</i> (fish) <i>sate</i>
		12.50	14.30	12.87	230.18	

According to the data in Table 3, By and large, traditional Balinese foods made with vegetables have a higher calorie content than those made with animal products. It is not certain that meatless and animal-free dishes contain fewer carbs, proteins, fats, or calories. It is material dependent. As with vegan food processed with plant-based materials (gluten), these ingredients are also high in carbohydrates due to their origin in starchy flour.

Additionally, the method of cooking affects the nutritional value of the food. The calorie content of foods can be increased by processing them with oil or by frying them. It is impossible to determine which food is superior based on the data above; it all depends on

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Balinese traditional plant-based foods, such as *sate lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *sate*, and *urutan*, which are made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

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Author Contributions

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REVIEW SUMMARY

Ref. Number : 22321E6V
Name of Client : Mrs. Ni Putu Eka Trisdayanti
Document Title : A NOVEL VEGETARIAN FOOD BASED ON BALINESE TRADITIONAL FOODS: Variety, Processing, and Nutrition
Number of Words : 2941 words
Date : 03/05/2022

NO	DETAILS
1	222 adjustments were done to the manuscript, including adjustments on the grammar, spelling, punctuation, and conventions.
2	Based on the given Author Guideline, your article has met the referred standard.
3	To enhance the readability considering the article might be read by global readers, it is suggested to provide clearer explanation to the special/local term used, for example <i>Kluwek</i> , <i>Sambel Embe</i> , <i>Base Selem</i> , <i>Kalasan</i> , etc. It is suggested to explain by mentioning the scientific species classification or writing brief description.
4	<p>The manuscript could be improved by elaborating the conclusion based on the research objective written on the beginning of the manuscript (i.e., "this study aimed to <u>establish the nutritional content</u> of traditional Balinese plant-based foods and <u>compare them</u> to the nutritional value of Balinese meat-based cuisines").</p> <p>The conclusion only provided the brief statement of the nutritional value but not yet comparing it to the meat-based cuisines.</p>
5	<p>The Abstract provided should include 1) Background: Place the question addressed in a broad context and highlight the purpose of the study; 2) Methods: Describe briefly the main methods or treatments applied; 3) Results: Summarize the article's main findings; and 4) Conclusions: Indicate the main conclusions or interpretations, as suggested by the Journal Template.</p> <p>The manuscript's abstract has provided them in brief.</p>

Sincerely,

Desak G Chandra Widayanthi
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10 MEI 2022

The screenshot shows the author dashboard for Canrea Journal. The page title is "Canrea Journal: Food Technology, Nutritions, and Culinary Journal". The breadcrumb trail is "461 / Trisdayanti et al. / A novel vegetarian food based on Balinese traditional foods: variety, processing, and nutrition". The "Production" tab is selected, showing a "Production Discussions" table with two entries:

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Type of the Paper (Article)

A novel vegetarian food based on Balinese traditional foods: variety, processing, and nutrition

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Food Production Management, Bali Tourism Polytechnic

Abstract

Changing diet preference to vegetarian is certainly not easy. Most people are very dependent on the delicious taste of meat, so it is very difficult to switch to plant-based foods. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. With these issues in mind, and to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. The sample of Balinese traditional plant-based foods was analysed for their nutritional content. The data were analysed using the descriptive qualitative method. The Balinese traditional plant-based foods found in Ubud were *Sate Lilit*, *Kuah Kare*, Balinese soup, *Sayur Urap*, *Betutu*, *Lawar*, *Tum*, *Dendeng/Ati*, *Sisit*, *Sate*, and *Urutan*; which is made similar to Balinese food processing using Balinese spices (*Base Genep*) contains good nutrition.

Article History

Received xxxxxx

Accepted xxxxxx

Keyword

Balinese traditional plant-based foods, Variety, Processing, Nutrition

1. Introduction

Plant-based eating preference, that emphasizes fruits, vegetables, whole grains, legumes, nuts, and seeds, is known as vegetarian diets (1–3). These diets are frequently thought to be meatless and animal-free. There are many types of vegetarian diets, the most common of which are semi-vegetarian, pescatarian, and vegan (4,5). The reasons for adopting certain eating preferences vary and include ethical considerations, religious convictions, environmental and cultural concerns, as well as health-related considerations (6–10). According to the American Dietetic Association (ADA), over 4.9 million (2.3%) adults in America turned vegetarian in 2006, and approximately 1.4% went vegan, while approximately 900 adults in Canada became vegetarian (7). The result of a survey by the Vegetarian Resource Group (VRG) in 2016 showed that approximately 3,7 million Americans are vegan, and 4.3 million Americans are vegetarian but not vegans (11). In Indonesia, the number of vegetarians registered in the Indonesia Vegetarian Society (IVS) increase significantly (12). In 1998, the number of registered vegetarians was around five thousands and it has increased to sixty thousands registered members in 2007 (13).

Changing diet preference to vegetarian is certainly not easy (14,15). Most people are very dependent on the delicious taste of meat, so it is very difficult to switch to plant-based foods (16,17). Moreover, Balinese traditional foods (18,19), which are generally made from meat with its special spices, are very difficult to replace. The majority of vegetarian stalls, which sell Chinese vegetarian cuisine, are not necessarily accepted by the Balinese in particular. In addition, tourists visiting Bali, especially vegetarians, will find it difficult to enjoy Balinese specialties, which are predominantly made from meat. Moreover, due to religious beliefs, many visitors are not allowed to eat pork or beef.

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With these issues in mind, and to suit the demands of both local communities and tourists, some vegetarian vendors in Bali started to offer vegetarian versions of traditional Balinese foods. These vegetarian cuisines are prepared using vegetables and a touch of Balinese culinary arts such as Balinese spices (*Base Genep*), with the result resembling Balinese cuisine. The presence of these stalls can meet all of the community's and tourists' needs.

In our preliminary survey, we found that there is a type of vegetarian cuisine, namely *Tum* that is processed from analog meat made of high protein legumes such as soybeans, mungbeans, etc. combine with Balinese spices. This analog meat looks and tastes similar to *Tum* from meat. In addition, there are several forms of Balinese traditional

Plant-based meals available at vegetarian stalls throughout Bali. As a start, the research was undertaken in Gianyar Regency, specifically in Ubud, where the Ubud area has been declared an International Gastronomic Destination by the UNWTO (16,20,21).

To establish the baseline of nutritional data on some of the most popular vegetable-based traditional Balinese foods, it is important to conduct a nutritional analysis. Therefore, this study aimed to establish the nutritional content of traditional Balinese plant-based foods and compare them to the nutritional value of Balinese meat-based cuisines. Additionally, the authors also conducted a survey on the types or varieties of Balinese vegetarian foods sold in the Ubud area, including the ingredients used and their processing techniques.

2. Materials and Methods

The research was conducted through interviews and observations at all vegetarian food stalls selling traditional Balinese vegetable dishes in the Ubud Gianyar area. The information gathered included the types of vegetarian foods sold at each stall and their processing techniques. The nutritional content (carbohydrates, moisture, protein, fat, and calorie content) was then analyzed using standard methods. Data were analyzed using a quantitative and qualitative approach. The findings from this study were compared to those of previous studies on Balinese specialties (animal-based).






3. Results and discussion

3.1. Types of Balinese traditional plant-based foods in Ubud Gianyar

Table 1 summarizes the types and varieties of Balinese traditional plant-based foods that were sold in the Ubud Gianyar area. In total, there were eleven types of plant-based Balinese traditional foods found in the study area. These include *sate lilit* made from jackfruit meat, *lawar* made from string beans, *tum* and *urutan* made from analog meats, *betutu* and *sisit* made from gluten, *dendeng* made from mung beans, *sayur urap*, *kuah kare*, and Balinese soup, all made from vegetables.

The processing methods and materials used for these plant-based foods are shown in Table 2. The main ingredients for these dishes come from leafy vegetables, beans, coconut milk, jackfruit meat, papaya, mung bean, string bean, gluten, and analog meat.

Table 1. Types of Balinese traditional plant-based foods in Ubud Gianyar.

No	Types of Balinese traditional plant-based foods	Picture
1	<i>Sate lilit</i> vegan	
2	<i>Sayur urap</i>	
3	<i>Kuah kare</i>	
4	Balinese soup	
5	<i>Lawar</i>	

6. *Tum*



7. *Betutu*



8. *Dendeng/ati*



9. *Sisit*



10. *Sate tusuk*



11. *Urutan*



Table 2. Balinese traditional plant-based Food Processing Method.

No	Type of Balinese traditional plant-based Food	Processing Method
1.	<i>Sate lilit</i>	Young jackfruit meat was boiled, mashed, and combined with a mixture of mung beans, <i>base genep</i> , grated coconut, tapioca flour, salt, pepper, brown sugar, and coriander. This mixture was formed into a dough, shaped, wrapped, and deep-fried.
2.	<i>Sayur urap</i>	Vegetables (spinach, sprouts, string beans) were cleaned, boiled, and drained. The boiled vegetables were added and mixed with grated coconut, <i>sambal embe</i> , fried onions, and limes.
3.	<i>Kuah kare</i>	Vegetables (pumpkin, string beans, and carrots) were cleaned and cooked with spices, and coconut milk, then sprinkled with fried onions.
4.	Balinese soup	Vegetables (pumpkin, string beans, carrots, spinach, and corn) were cleaned and cooked with spices, then sprinkled with fried onions.
5.	<i>Lawar</i>	String beans were cleaned and boiled until cooked (not mushy), then cut into short pieces. Papaya was cleaned, peeled, and cut into matchstick-size, then sprinkle with salt. The matchstick papaya was boiled until cooked (not mushy), drained, and squeezed. The analog meat was used to replace the beef. The analog meat was cleaned, cooked, drained, and coarsely chopped. Cut the small haisom (hysom imitation) lengthwise. The analog meat was mixed with grated coconut, then the <i>base selem</i> and <i>sambal embe</i> were added to the mixture. The mixture was seasoned with salt and lemon juice, squeezed, and mixed well. String beans were added and then stirred until thoroughly blended.
6.	<i>Tum</i>	<i>Base genep</i> was boiled into coconut milk to make <i>Kalasan</i> coconut milk, then mixed with boiled and chopped analog meat and pulverized <i>kluwek</i> . The mixture was added with fried onion sauce, fried onions, salt, and seasonings. The mixture was wrapped in banana leaves and steamed for 45 minutes.
7.	<i>Betutu</i>	Gluten dough was cut and shredded. The shredded gluten dough was mixed with spices and salt. The mixture was wrapped with banana leaves and steamed for 30 minutes.
8.	<i>Dendeng/ati</i>	Mung beans were soaked for a day and drained, then added with coriander, and salt. The mixture was steamed and cooled. The cooled mixture was thinly sliced and added with pulverized garlic, shallots, chilies, tomatoes, candlenuts, and brown sugar which was already sautéed with water until cooked.
9.	<i>Sisit</i>	Gluten dough was boiled, added with soy sauce, stirred, let stand for a while then baked. This dish can be served with <i>sambal matah</i> .
10.	<i>Sate tusuk</i>	Vegetable protein comes from soybean scalded with hot water and drained. The blended garlic, coriander, candlenut, chili, brown sugar, and salt were first stir-fried, then water and vegetable protein were added, and cooked to dry. The seasoned vegetable protein was skewered and grilled. Peanut sauce (fried peanuts were blended, boiled until thickened, and added with soy sauce, fried onions, and lime) was used as a dipping sauce.
11.	<i>Urutan</i>	<i>Base genep</i> sauteed until cooked, mixed with meat analog that has been doused in hot water, and added with 1 tablespoon of wheat flour and 1 tablespoon of tapioca flour. The dough was placed on top of the bean curd, rolled, steamed, and fried briefly.

Several vegetarian stalls and restaurants in Ubud Bali already made an innovation by producing Balinese traditional plant-based Food. Vegetarian cuisine is prepared with vegetable products and infused with Balinese culinary arts such as Balinese spices (*base genep*) (22), with the result resembling a Balinese meal. The existence of these stalls and restaurants can complement all the needs of the community and tourists.

Animal-based ingredients in traditional Balinese foods can be replaced with vegetable-based ingredients, such as meat analogs and plant-based flavorings.

The flavoring used includes plant-based materials such as coriander, mushroom, peppers, etc. Meat analog is a food ingredient whose shape, texture, and taste are very similar to meat, but it does not contain animal products at all (23,24). Usually, meat analogs are made from mushrooms, tempeh, tofu, and jackfruit meat (25–27). Some of the most common plant-based ingredients used in plant-based Balinese traditional foods include:

- a. Proteina was known in the market by the trademark Proteina. Proteina contains vegetable protein from pure soybeans, that have been separated from the oil, without the addition of other ingredients.
- b. Haisom is a vegetable-based product that contains vegetable protein, mushrooms, wheat, and vegetable spices. The cooking method is quite easy, namely by sautéing, mixing in capjay, or cooking in vegetarian oyster sauce.
- c. Gluten can be used for vegetarian and vegan dishes. Gluten is an amorphous (irregular form) of protein found in the endosperm (and flour made from it) of certain cereals, most notably wheat, rye, and barley (28). Wheat contains the most gluten of the three. Gluten can account for up to 80% of the total protein in the flour and is composed of gliadin and glutenin proteins. Gluten is used to make dough chewy and expands (29). Gluten can be made by food processors themselves and can be purchased in the market. Gluten can be made by kneading wheat flour with water to form a sticky dough strand. The dough is then rinsed with water while being slowly kneaded to remove the starch. After rinsing, the remaining product is pure gluten with a chewy and sticky texture. To make it more practical, the vegetarian food cook said that they often buy artificial meat or gluten in online or offline markets. Artificial meat available in the market is not only made from wheat flour but can also be made from pure soybeans, what they usually use is a product with the Proteina brand. In addition, vegetarian cooks often use haisom/sea cucumber which is sold under various trademarks.

Tum is traditionally produced using fresh blood as the coloring. In the production of vegan *tum*, fresh blood is substituted using *kluwek*. *Kluwek* fruit meat has the potential to be used as medicine and herbs (30). However, before it is used as food ingredients, *kluwek* must be sliced and soaked in water to remove undesirable compounds such as cyanide, a toxic substance that can be harmful to the body.

3.2. Nutritional Content of Balinese traditional plant-based Food

The nutritional contents of Balinese traditional plant-based foods are shown in Table 3.

Table 3. Nutritional Content of Balinese traditional plant-based foods.

No	Type of Balinese Vegetarian Food		Nutrient Content					
			Water content (%bb)	Ash Content (%bb)	Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)
1.	<i>Sayur</i>	<i>Urab</i>	83.07	1.33	2.61	6.51	6.48	94.93
	<i>Vegan</i>							
2.	<i>Balinese</i>	<i>Soup</i>	88.70	1.24	3.21	1.94	4.90	49.93
	<i>Vegan</i>							
3.	<i>Kare</i>	<i>Vegan</i>	81.28	1.28	6.09	5.20	6.14	95.78

4.	<i>Sate Tusuk Vegan</i>	60.44	2.37	11.75	10.69	14.76	202.23
5.	<i>Tum Vegan</i>	53.31	1.38	7.75	12.97	24.6	246.07
6.	<i>Sate Lilit Vegan</i>	37.74	2.43	5.17	26.69	27.97	372.76
7.	<i>Lawar Vegan</i>	75.25	1.10	2.67	10.95	10.03	149.38
8.	<i>Ati vegan</i>	8.45	3.52	14.47	32.71	40.84	515.68
9.	<i>Sisit Vegan</i>	50.65	1.77	20.05	10.24	17.28	241.48
10.	<i>Betutu Vegan</i>	60.72	1.47	14.6	13.8	9.43	220.12
11.	<i>Urutan Vegan</i>	35.1	2.88	6.58	33.89	21.56	417.59

The results of the nutritional value of Balinese traditional plant-based foods were compared to other studies of Balinese specialties (animal-based).

Table 4. Comparison of the Nutrient Content of Balinese traditional plant-based Foods with Balinese traditional animal-based Foods.

No	Type of Food	Nutrient Content				Comparison Results
		Protein (%bb)	Fat (%bb)	Carbohydrate (%bb)	Calories (kcal)	
1	<i>Vegan sate lilit</i>	11.75	10.69	14.76	202.23	<ul style="list-style-type: none"> The protein content of <i>sate lilit vegan</i> was higher than <i>sate lilit</i> from beef but lower than <i>pork sate lilit</i> Fat and calories content of <i>sate lilit vegan</i> was higher than <i>pork sate lilit</i>, but lower than beef <i>sate lilit</i> Carbohydrate content of <i>sate lilit vegan</i> lowest compared with beef <i>sate lilit</i> and pork <i>sate lilit</i>
	<i>Beef sate lilit (31)</i>	5.74	23.29	24.89	332.13	
	<i>Pork sate lilit (32)</i>	27.02	2.93	15.64	197.01	
2	<i>Vegan Lawar</i>	2.67	10.95	10.03	149.38	<ul style="list-style-type: none"> Protein, fat, and calories content of <i>lawar</i> vegan was the lowest one. Carbohydrate of <i>lawar</i> vegan was higher than beef <i>lawar</i> but lower than pork <i>lawar</i>
	<i>Beef Lawar (33)</i>	11.14	18.0	6.61	233	
	<i>Pork Lawar</i>	5.74	13.87	11.97	195,67	
3	<i>Vegan Betutu</i>	14.6	13.8	9.43	220.12	<ul style="list-style-type: none"> The protein of <i>vegan betutu</i> was lower than <i>betutu</i> Fat, Carbohydrate, and calories of <i>vegan betutu</i> were higher than chicken <i>betutu</i>
	<i>Chicken Betutu (31)</i>	20.6	7.82	4.54	170.98	
4	<i>Vegan urutan</i>	6.58	33.89	21.56	417.59	<ul style="list-style-type: none"> The protein of <i>vegan urutan</i> was lower than beef <i>urutan</i> Fat, carbohydrates, and calories of <i>vegan urutan</i> were higher than beef <i>urutan</i>.
	<i>Beef Urutan (31)</i>	25.66	27.8	1.99	361.53	
5	<i>Vegan Tum</i>	7.75	12.97	24.6	246.07	<ul style="list-style-type: none"> The protein of <i>vegan tum</i> was lower than beef <i>tum</i> Fat, Carbohydrate, and calories of <i>vegan tum</i> were higher than beef <i>tum</i>
	<i>Beef Tum (31)</i>	18.25	11.09	4.64	191.37	
6	<i>Vegan sate</i>	11.75	10.69	14.76	202.23	

<i>Languan</i> (fish) (31)	<i>sate</i>	12.50	14.30	12.87	230.18	<ul style="list-style-type: none"> • The protein of <i>vegan sate</i> was lower than <i>languan</i> (fish) <i>sate</i> • The carbohydrate of <i>vegan sate</i> was higher than <i>languan</i> (fish) <i>sate</i>
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According to the data in Table 4, By and large, traditional Balinese foods made with vegetables have a higher calorie content than those made with animal products. It is not certain that meatless and animal-free dishes contain fewer carbs, proteins, fats, or calories. It is material dependent. As with vegan food processed with plant-based materials (gluten), these ingredients are also high in carbohydrates due to their origin in starchy flour.

Additionally, the method of cooking affects the nutritional value of the food (34,35). The calorie content of foods can be increased by processing them with oil or by frying them (36,37). It is impossible to determine which food is superior based on the data above; it all depends on consumer preferences. The nutritional content information can be used to assist the community in making food selections.

4. Conclusions

Balinese traditional plant-based foods, such as *sate lilit*, *kuah kare*, Balinese soup, *sayur urap*, *betutu*, *lawar*, *tum*, *dendeng/ati*, *sisit*, *sate*, and *urutan*, which are made similar to Balinese food processing using Balinese spices (*base genep*) contains good nutrition.

Acknowledgments

The author would like to thank the Bali Tourism Polytechnic (Politeknik Pariwisata Bali) especially the Research and Community Service Unit (P3M PPB) which has provided research funding assistance.

Author Contributions

For this research, Ni Putu Eka Trisdayanti in the idea, writing, and coordinating all research processes. For AA. Gd. KP. Dalem and Made Purwa Dana Atmaja contributed to the survey activities in the field.

Funding

Not applicable.

Institutional Review Board Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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