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DIVERSITY OF *SATE* (SATAY) AS INDONESIAN ANCIENT FOOD

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Abstract
Sate (satay) dishes have a wealth of ingredients and spices spread throughout Indonesia, which produces a diversity of types and flavors of satay. In sate dishes, the way pieces of meat are served on skewers was affected by Arabic culture, which influence is most visible in the development of Indonesian food culture. On average, sate is made using grilling, which is an ancient type of cooking technique survived into modern times. For centuries, wood and charcoal have been some of the oldest human-made fuels as important ingredients for cooking and heating in ancient times and even today. Apart from being an everyday food, sate is Indonesia's gastronomic culinary cultural heritage with a wide diversity that needs to be preserved because it functions as a national identity and has excellent potential for developing culinary tourism.

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Introduction

Indonesia is an archipelago with a large number of races and cultures that influence the diversity of traditions and food [1]. It has a wealth of natural resources and a large population [1]. The diversity of Indonesian customs and ceremonies, as well as food diversity is very well known [2]. Indonesia is a place for various types of ethnicities with a high contribution to its culinary delights [3]. Maintaining and preserving Indonesia's cultural heritage is our responsibility as a young generation because it is a legacy from our ancestors [4]. Traditional culinary delights with history and high quality must be fully exploited and promoted as assets that are part of the country.

Regional specialty products are obtained from different local plants and livestock used in their preparation resulting in traditional dishes acquiring certain taste values that cannot be recreated in other regions [5].

Sate dish or satay is an Indonesia's culinary heritage dish with a huge variety of ingredients and spices spread throughout Indonesia, which produces many types and flavors of satay [6]. Mostly, an ancient technique, such as charcoal grilling is a common *sate* cooking method in Southeast Asian countries [7]. From ancient times until now, wood and charcoal fuels have been used and are one of the oldest human-made fuels for cooking and heating [8,9].

The *sate* cooking method of grilling is a complex physico-chemical phenomenon. Food processors using grilling techniques usually rely on their intuition and experience during the process. These intuitions and experiences come from habits and heritage passed down by ancestors from generation to generation [10].

Research on mapping Indonesian food culture is expected to serve as an initial contribution to increasing market awareness of Indonesian cuisine and its richness, especially through exploration of social and cultural aspects [11]. Writing an article about *sate* in Indonesia aims to support the preservation of gastronomic culinary heritage foods that are an important part of tourism development in Indonesia.

Objects and methods

This research aims to explore the historical traces of *sate* and various types of *sate* that exist in Indonesia. The methodology used in this research includes analysis of food ethnographic literature, history, culinary traditions and types of *sate* from relevant articles and book chapters containing reviews, summaries and the authors' thoughts.

This article uses offline and online literature sources. Offline literature consists of cookbooks, recipe books and food history books (revealed from Perpustakaan Nasional Republik Indonesia, Jakarta, Indonesia). Meanwhile, online literature was collected from national and international journals. Data was processed using Microsoft Excel (Microsoft Corporation, USA) and presented in the

form of tables, pie charts and maps. To verify the data and strengthen the literature study, several small field observations were carried out by examining satay recipes and taking photos of satay.

Results and discussion

Indonesian food satay, which is usually called *'sate'*, has a history of syllables originating from one of the Chinese tribes, namely Minann, in whose dialect the word *'sa tae bak'* appeared, which means 'three pieces of meat'. There are other sources that say satay originates from the Middle East because it comes from the Tamil word *'catai'*, which means meat. Satay first appeared in the 19th century. Initially, Indonesian people cooked satay by boiling it. However, after the arrival of Tamil and Gujarati Muslim traders in Indonesia and the introduction of grilled kebabs, satay began to be cooked by grilling. Gradually, satay has developed with the application of special ingredients and processing into a traditional Indonesian food. With its distinctive taste from the aroma of Indonesian spices, *sate* is able to penetrate geographical boundaries. Therefore, *sate* is considered one of Indonesia's gastronomic culinary heritage [12].

With the culture of eating *rijsttafel*, *sate* is served not only simply but also luxuriously on plates. The modern *sate* recipe first appeared in the book "Kokki Bitja" (1857) written by Nonna Cornelia. Recipes for some types of *sate* are still written using the old Indonesian spelling. The word *sate* is written as *'sesate'*. Some of the recipes include: *sesate Bandang* (milkfish satay), *sesate Babi* (pork satay), *sesate Ajam* (chicken satay), *Sampi* (beef satay) [13]. Furthermore, a large book on national cuisine entitled "Mustika Rasa: Indonesian Recipes from Sabang to Merauke" was published in 1967. This book was published by the Department of Agriculture, Republic of Indonesia. There are 1500 various "Indonesian" recipes with influences from Chinese, Arabic, Indian and European flavors. The book is written using Indonesian, a mixture of old and new spellings. For example, the word *'sesate'* (old spelling) was changed to *sate* (new spelling). Several satay recipes have been written including *sate Ajyam* (chicken satay), *sate Babi* (pork satay), *sate Bandeng* (milkfish satay), *sate Kerang* (shellfish satay), *sate Lilit, sate Madura, sate Padang and sate Pusut.* In the 1967 book Mustika Rasa, it not only contains food recipes but also food chemicals. By consuming a diversity of foods, there is the potential to increase consumption of various food chemicals such as carbohydrates, fats, proteins, water, ash, and various vitamins, thereby preventing humans from malnutrition. In the chapter there is a photo of a child suffering from kwashiorkor who recovered due to consuming adequate nutrition. The chapter on food chemicals is included as one of the government's efforts to eradicate malnutrition [13].

In the world of culinary tourism, Indonesia is famous for its food diversity. *Sate* has a taste that comes from a mixture of different spices in each tourist destination in Indonesia and each seller has its own uniqueness [6]. Sate skewers as a means of serving food, such as beef *sate*, were initially made manually by hand with less-than-optimal results, then the manufacturing process for making these skewers was developed using a semi-automatic machine. *Sate* skewer products made from bamboo trees are still abundantly available in Indonesia [14].

Sate is one of the most popular foods in Indonesia, served everywhere, from street food to luxury restaurants in hotels [15]. One element of Indic culture that was popular during the colonial period was the food culture called *rijsttafel*. If interpreted literally, *rijst* means rice and *tafel* means table, combined into a "rice dish". The impression can be seen from the way indigenous food culture is packaged through the concept of table settings and dishes with a touch of the Western style [16]. As the country of origin of *sate*, Indonesia has various types of *sate* recipes. Typical Indonesian *sate* is served with a sauce with a thick texture in the form of spices, peanut sauce, or others, usually accompanied by a condiment of sliced cayenne pepper, red onion and cucumber. It is eaten with processed rice such as *nasi, lontong,* or *ketupat*. Variations are usually named based on the region of origin of the *sate* recipe, type of meat, ingredients, or manufacturing process. Several types of *sate* typical of regions in Indonesia are *sate Madura*, *sate Padan*, *sate Ponorogo* and *sate Kelinci* [17].

In Indonesia, *sate* sellers roam the streets and alleys of every city and announce their presence with wooden sticks that they hit on their portable grills. When the orders start coming in and *sate* has been grilled, smoke and a sweet aroma come out and attract other buyers. Ginger, coriander and palm sugar are the main flavors. The tamarind in the marinade acts as a powerful tenderizer, making even very chewy meat tender [18]. For centuries, grill charcoal fuel has been one of the oldest human-made fuels. It was an important ingredient for cooking and heating in ancient times and even today charcoal is used in grilling cooking techniques to make *sate* [8,10].

One of Indonesia's dominant tourism assets is culinary tourism because Indonesia has a great variety of cultures, agriculture, and plantations that affect culinary diversity in each region so that domestic and foreign tourists are interested in visiting regions in Indonesia to taste the typical food and drinks of the region [62].

The way of eating and serving food, the function of food and the composition of spices are characteristics of a region. Using regional specific features can produce Indonesian culinary delights with regional excellence that cannot be separated from the identity of the region of origin. An example of *sate* that uses the name of the original region is *sate Madura*, which is famous for its peanut sauce [6]. Some other examples of using regional names for *sate* are: *sate Padang* (the name of the city in West Sumatra province), *sate Blora* (the name of the city in West Central Java province), *sate Ponorogo* (the name of the city in East Java province), *sate Makassar* (the name of the city in South Sulawesi province) [25,42,58,75].

Table 1. Types of *sate* according to provinces in Indonesia

No	Island	Province	Sate	References
1	Sumatra	Nanggroe Aceh Darrussalam	*Gurita*	[19]
2		Nanggroe Aceh Darrussalam	*Dongdong*	[20]
3		Nanggroe Aceh Darrussalam	*Matang*	[21]
4		North Sumatra	*Kerang*	[22]
5		West Sumatra	*Danguang-Danguang*	[23]
6		West Sumatra	*Lokan*	[24]
7		West Sumatra	*Padang*	[25]
8		South Sumatra	*Cucuk Manis*	[26]
9		South Sumatra	*Pentul*	[27]
10		South Sumatra	*Ayam Kampung*	[28]
11		Riau Islands	*Ikan Senapelan*	[29]
12		Jambi	*Rang Kayo Hitam*	[30]
13		Bengkulu	*Pancah Daging*	[31]
14		Bengkulu	*Gembolo*	[32]
15		Lampung	*Tuhuk*	[33]
16	Java	West Java	*Maranggi*	[34]
17		West Java	*Terpedo*	[3]
18		West Java	*Udang*	[35]
19		West Java	*Kalong*	[36]
20		West Java	*Jando*	[3]
21		Banten	*Bandeng*	[15]
22		Banten	*Bebek Cilegon*	[37]
23		DKI Jakarta	*Asem*	[38]
24		DKI Jakarta	*Lembut*	[39]
25		DKI Jakarta	*Taichan*	[40]
26		Central Java	*Balibul*	[41]
27		Central Java	*Loso*	[6]
28		Central Java	*Blora*	[42]
29		Central Java	*Suruh*	[43]
30		Central Java	*Ambal*	[44]
31		Central Java	*Bumbon*	[45]
32		Central Java	*Buntel*	[46]
33		Central Java	*Kere*	[46]
34		DI Yogyakarta	*Telur Puyuh*	[47]
35		DI Yogyakarta	*Ratu*	[48]
36		DI Yogyakarta	*Petir*	[49]
37		DI Yogyakarta	*Sor Talok*	[50]
38		DI Yogyakarta	*Klatak*	[51]
39		DI Yogyakarta	*Kikil*	[52]
40		East Java	*Klopo*	[53]
41		East Java	*Kelinci*	[54]
42		East Java	*Karak*	[55]
43		East Java	*Gebug*	[56]
44		East Java	*Komoh*	[57]
45		East Java	*Madura*	[17]
46		East Java	*Ponorogo*	[58]
47	Nusa Tenggara	Bali	*Kakul*	[59]
48		Bali	*Languan*	[60]
49		Bali	*Plecing*	[3]
50		Bali	*Lilit*	[61]
51		Bali	*Lilit Lindung*	[59]
52		West Nusa Tenggara	*Rembiga*	[62]
53		West Nusa Tenggara	*Bulayak*	[62]
54		West Nusa Tenggara	*Tanjung*	[62]
55		West Nusa Tenggara	*Ampet*	[3]
56		West Nusa Tenggara	*Pusut*	[63]
57		East Nusa Tenggara	*Kerang Belawar*	[64]
58	Kalimantan	West Kalimantan	*Manis*	[65]
59		West Kalimantan	*Kuah*	[66]
60		West Kalimantan	*Tulang*	[67]
61		East Kalimantan	*Payau*	[68]
62		East Kalimantan	*Babi*	[69]
63		North Kalimantan	*Ikan Pari*	[70]
64	Sulawesi	North Sulawesi	*Ragey*	[71]
65		North Sulawesi	*Kolombi*	[72]
66		Gorontalo	*Tuna*	[73]
67		West Sulawesi	*Tambulinas*	[74]
68		South Sulawesi	*Makassar*	[75]
69		Southeast Sulawesi	*Pokea*	[76]
70	Papua	Papua	*Ulat sagu*	[77]

Figure 1. Map of *sate* diversity in Indonesia

The Lombok area, West Nusa Tenggara, has a wealth of traditional culinary delights with great potential to be developed to support the development of tourist attractions, especially culinary tourism. Some of the *sate* included in culinary tourism are (a) *Sate Bulayak* is a meat and offal based dish seasoned with sasak spices, grilled using coconut shells or coir and served with peanut sauce (pounded with garlic, coriander and chili), (b) *Sate Tanjung* comes from skipjack or langoan fish. The savory taste of fish meat and coconut milk and the spicy taste obtained from spices are very pronounced when enjoying *Sate Tanjung*. and (c) *Sate Rembiga* is made from diced meat or offal that is marinated in a mixture of ground spices based on shallots, cayenne pepper, sugar, candlenut, shrimp paste, and several other spices [62].

It can be concluded from Table 1 and Figure 2 that the largest number of variations of *sate* in Indonesia is on the island of Java (44%) and the island of Sumatra (21%). Java Island has the largest and most diverse population. It has a large library of traditional foods. With the combination of various tribes that have entered the island of Java, there is more and more exploration of new menus. This makes the food on the island of Java increasingly diverse. Javanese people usually serve satay on special occasions such as sacred weddings, social gatherings and baby births. This satay dish is made as a main dish with meat as a main ingredient. A sweeter taste compared to that in other regions is a characteristic of the culinary arts of the people of the island of Java, Indonesia [78].

The arrival of the Arabs gave several distinctive features to Indonesian culinary delights, namely satay, which is made using a skewer from lamb or goat meat and served whole on the skewer. The spices available range from seed, fruit, root, bark, or vegetative substance, and the most common include coriander seeds, pepper, nutmeg, cumin, and cloves. Either grated, chopped, or dried, these spices, together with other fresh ingredients, play a part as a seasoning for the purpose of flavouring the food (in Indonesian language, it is called bumbu) [79]. However, what makes the presentation of typical Indonesian satay different is the use of peanut sauce served with satay originating from the Java region. India has also influenced Indonesian culinary delights, as seen from the Sumatran cuisine, which serves meat with vegetables using spices such as cloves and nutmeg to provide a distinctive taste [11].

It can be seen from the pie chart in Figure 3 that on average a type of raw materials most widely used are mammals (51%), such as cattle and goat. Since the beginning of human civilization, meat consumption and livestock farming have been inseparable because they have a major impact on the environment. Meat provides high quality protein, vitamins and minerals while offering pleasure when consumed [80]. The variety of *sate* is a form of protein-type functional food. Functional food is food which wide variety will enable consumers to optimize their diet because it is nutritionally balanced and provides a real opportunity to reduce the risk of malnutrition and improve physical health [81].

The ingredients used for *sate* are more specific with the use of halal ingredients. Indonesia is a country where the majority of the population is Muslim. The life of a Muslims is always connected with the concept of halal in their daily life, especially in food [82]. Indonesia plays an important role in halal food production because it is one of the largest countries in Asia, thus guaranteeing halal culinary standards in Indonesia. This halal culinary has been developed as an important part of Indonesia's food security strategy [83].

Several types of *sate* made from mammals include *sate Balibul, sate Kelinci, sate Terpedo, sate Jando, sate Ampet. Sate Balibul* is a local Indonesian food in Central Java made from lamb under five months of age, which is popular because it has a soft texture [41]. *Sate Kelinci* made from rabbit is one of the typical foods of the city of Batu, one of the cities located in the province of East Java, Indonesia, which has superior tourism. *Sate Kelinci* is very popular as a culinary specialty that is sought after by tourists. The rabbit meat is obtained from local breeders in Batu City. Rabbit meat is popular because of its high protein content and low fat and cholesterol content. Thus, this meat is healthier to consume [84].

Moreover, Indonesia's culinary traditions are shaped by its wealth of natural resources. The ingredients used to make food are not only meat but also offal. The use of offal has created a myriad of recipes for dishes made from

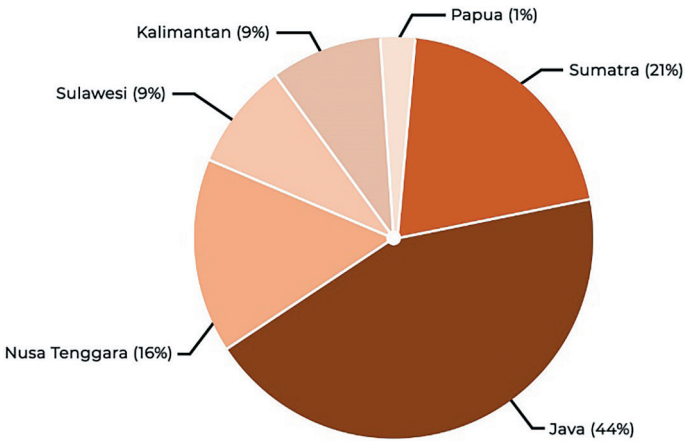

Figure 2. Pie chart of *sate* types according to provinces in Indonesia

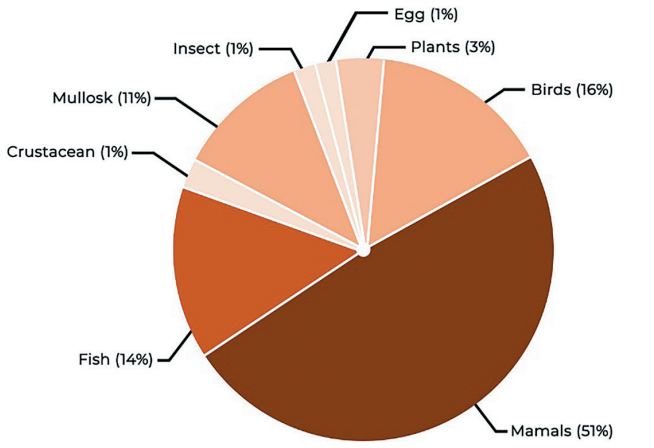

Figure 3. Pie chart of *sate* types according to the main ingredients

offal, resulting in culinary diversity throughout the country. There are several *sate* that use beef offal, including *sate Terpedo* (cattle penis), *sate Jando* (cattle nipple), *sate Ampet* (cattle liver, intestine, tripe) [3]. In the Banten province, especially the city of Cilegon, there is a typical satay dish made from duck, namely *sate Bebek Cilegon* [37].

Figure 4 shows *sate Madura*, which is a type of *sate* made from chicken. *Sate Madura* is one of the popular Indonesian satays that can be found easily in almost all regions of Indonesia, especially in big cities on the island of Java, such as Jakarta, Bandung and Surabaya. *Sate Madura* is usually made from grilled chicken and then served with peanut sauce plus a few slices of shallot [17].

Apart from satay that is made from meat, there is also a unique satay made from quail eggs, namely *sate Puyuh*, which comes from Yogyakarta. Quail satay is usually sold in angkringan (comes from the Javanese word *"angkring"*, which means a tool and place for selling food, around which the handle is curved upwards) [47].

It can be seen from the pie chart in Figure 5 that the most frequently used ingredient preparation process is cutting. *Sate* is a food, which main ingredient is meat cut into small pieces. They are skewered using bamboo which is cut into thin pieces, grilled using charcoal and seasoned with spices. In Indonesia, *sate* is usually served with rice or lontong [15]. *Sate* consists of boneless pieces of chicken, beef, pork or fish cut into cubes and skewered using coconut leaves or bamboo [7].

There is a unique ingredient preparation technique, namely chopping used, for example, for *sate Bandeng* and *sate Lilit* (Figure 6). One of the processed fish *sate* that is characteristic of Banten region is *sate Bandeng*, which is made from milkfish skewered on bamboo sticks. The process of making milkfish *sate* consists of several stages. Milkfish is cleaned and then loosened slowly, flesh and bones are separated from the skin. Flesh is mixed with spices, then put back into the milkfish skin and grilled [15]. *Sate Lilit* is *sate* from the island of Bali, which is famous in the international culinary world. *Sate lilit* is made from chopped chicken, seasoned with spices, then shaped into sere (a type of Indonesian spice with an elongated shape that functions to replace the sweeker) and grilled. *Sate lilit* is served almost in every cultural event for consumption and as an offering to ancestors [61].

It can be seen from the pie chart in Figure 7 that a seasoning base with the use of ground spices is most widely used. Ingredients such as chili peppers are also found in some dishes, showing traces of culinary exchange with the

Figure 4. *Sate Madura, which is famous for its peanut sauce*

Figure 6. *Sate Lilit*

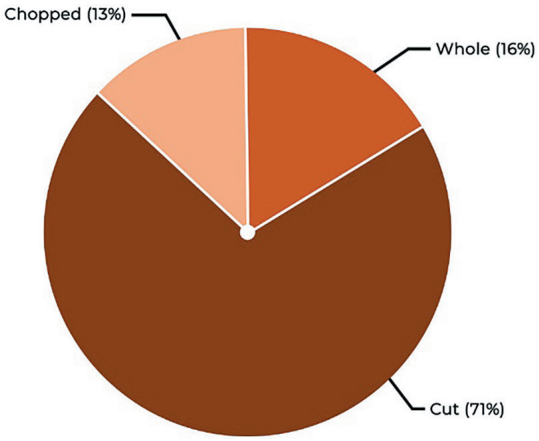

Figure 5. Pie chart of *sate* types according to ingredient preparation

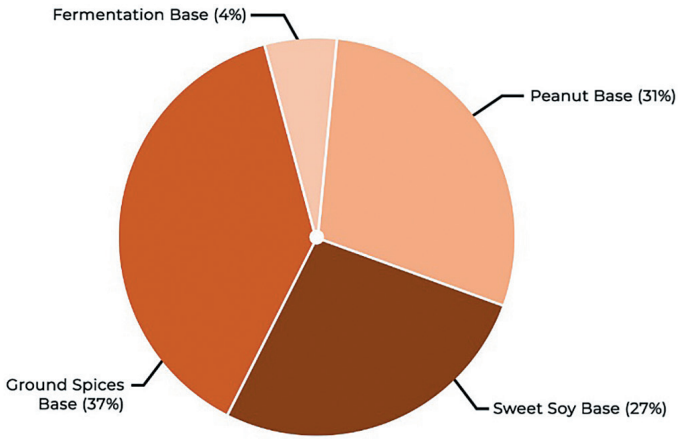

Figure 7. Pie chart of *sate* types according to a seasoning base

Colombians [3]. Mortar and pestle or stone grinder are the most important equipment so far. They are used to grind, crush and make a paste of spices, which are very important in Indonesian taste. It is necessary to choose a mortar that is slightly curved, heavy, sturdy and has a rough texture. If available, it is advisable to purchase mortar and pestle carved from volcanic rock as they are harder and, therefore, more durable. This is because many spices are hard and require a lot of effort to grind them by hand [85]. The example of *sate* that uses the ground spices base is *sate Padang*, which has become an icon of culinary tourism in Sumatra Island. *Sate Padang* is also made from pieces of chicken skewered with bamboo and grilled. It is served with a delicious spicy curry sauce typical of Padang city [86].

Sate Padang (Figure 8) is *sate* that uses seasoning based on ground spices. The use of different herbs, spices and ingredients in Indonesian cooking has become a characteristic that differentiates food from one place and another in Indonesia. There is a strong connection between the way people prepare food and ingredients that are present and available in their region [87]. It is an interesting fact that the use of local spices in the marination of grilled beef for *sate* can inhibit/lower the levels of toxic and harmful HCAs [7].

Taste, aroma and texture of grilled meat are influenced by herbs or spices used. Other factors, characteristics of meat, parameters of the cooking process, such as time and temperature, and the water content remaining after the grilling process, also have an influence [88]. In the process of cooking food, the most important aspects are time and temperature [10]. The purpose of cooking meat products is to reduce the moisture content and kill microorganisms to increase the storage time, as well as to improve taste and texture of food [89]. Cooking techniques in Indonesia are slightly different from other cultures and cuisines. The heat source in many homes is still a simple wood fire, although some modern homes use kerosene and gas stoves. Cooking containers are also simple, made of sheet iron or aluminum. Most Indonesians use very low heat in cooking, which means the food takes longer to cook. The key in preparing Indonesian dishes lies in mixing and blending spices; therefore, it is important to use only fresh ingredients when preparing Indonesian dishes [87].

It can be seen from the pie chart in Figure 9 above, that the final cooking technique with grilling is the most widely used. Cooking techniques in Indonesia are very simple, including those used to cook *sate,* such as boiling, frying and grilling. Different cooking methods had different effects on the nutrition value of chicken meat [90].

When it comes to braising, it's important to know whether cooking of meal should be started with cold or hot liquid. Meat such as chicken or beef should be added to the boiling liquid. This will close the pores and prevent meat juices from escaping, which causes meat to dry out. Frying involves using a lot of oil. Oil should be heated at 160–180 °C (325–350 °F), then food should be added and fried until dry. Grilling is a very popular cooking method,

Figure 8. *Sate Padang*

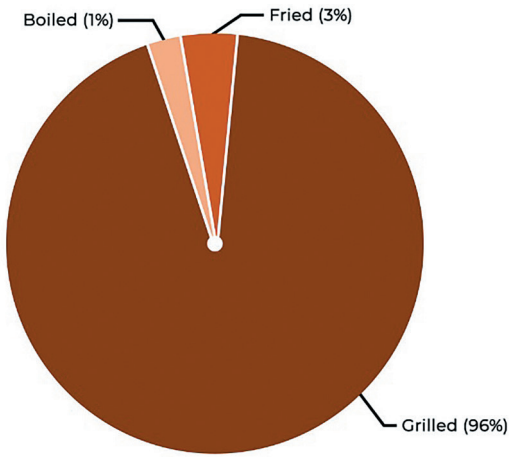

Figure 9. Pie chart of *sate* types according to the final cooking technique

which is widely used to make *sate*. *Sate* is always cooked with burning charcoal, making sure the fire is very low and the heat is very high by using a sturdy handheld bamboo fan. It is important to avoid dripping of meat juices into the fire as this will cause the flames to jump and add a very unpleasant burnt taste to the food [85].

Figure 10 is a picture of the process of grilling *sate* in Indonesia using charcoal as fuel. Charcoal production is carried out naturally through an artificial manufacturing process that has existed since ancient times. For centuries, humans have used the trial and error approach in production of charcoal producing various types of charcoal from natural organic materials ranging from wood and sawdust to waste materials, such as coffee husks cotton stalks, shells and bones [91].

The world now has a variety of cooking methods from ancient to modern, as well as a combination of ancient and modern methods. One of the oldest cooking methods is grilling. The grilling method uses dry heat and can be defined as a cooking process, during which raw materials are exposed to a heat source that uses thermal radiation for primary heat transfer. Grilling is not something easy because there are various variables that are difficult to control thoroughly [10].

Figure 10. *Sate* grilling process in Indonesia

Indonesia has several foster villages. One of them is *Kampung Oase Ondomohen,* which is located in the city of Surabaya, East Java Province, Indonesia and has the potential for the sustainable regional development. The village was giving this name because of the local initiative to process waste into products such as briquettes from tree branches and used charcoal from making *sate Klopo Ondomohen* [53].

Sate Klopo is a typical satay made from meat wrapped in coconut, then skewered and grilled using briquettes [53]. To cook beef on the grill, a charcoal fire over medium heat is prepared. Beef is grilled for two to five minutes (time will depend on how hot the fire is) until cooked through and started to show crispy dark brown spots. It is necessary to carefully turn the skewers over and continue grilling two to five minutes more until the other side is lightly browned. Meat should not be cooked for too long, because it will dry out [18]. Other cooking techniques used are frying and boiling. In Indonesia, these two techniques are applied using a tool called a *wajan* or *kuali* in Javanese, which has a shape similar to a wokpan. [93]. Although in Indonesia *sate* is usually cooked by grilling, there are also some types cooked by boiling, namely *sate Kerang* and frying, namely *sate Pentul* [22,27].

Conclusion

Sate (satay) dishes have a diversity of types and flavors obtained from various ingredients, including spices. In *Sate* dishes, the way the pieces of meat are served on skewers was influenced by Arabic culture, which is most visible in the development of Indonesian food culture. On average, *sate* is made using the grilling cooking technique, which is an ancient type of cooking technique survived into modern times. For centuries, wood and charcoal have been some of the oldest human-made fuels as important ingredients for cooking and heating in ancient times and even today.

Apart from being an everyday food, *sate* is Indonesia's gastronomic culinary cultural heritage with a wide diversity that needs to be preserved because it functions as a national identity and has excellent potential for developing culinary tourism.

The largest number of variations of *sate* in Indonesia is on the island of Java. Java Island has the largest and most diverse population. This makes the food on the island of Java increasingly diversified. *Sate* in Indonesia has a variety of food sources of protein, from mammals, which are most commonly used, to insects, which are very rarely found. In terms of preparation, the protein ingredients used are usually cut, but some are chopped and some are even served whole. The diversity of spices in Indonesia results in the great variety of seasoning bases for *sate*, some of which are often prepared using ground spices base, sweet soy base, peanut base and most rarely using the fermentation base.

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