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# Time-honored praxis in preparing smoked meat delicacy (kinuday) of the ibaloy indigenous people in Benguet, Philippines

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## Abstract

Every culture protects its indigenous knowledge and practices, distinguishing them from other cultures. A qualitative inquiry described the traditional processing methods in preparing smoked meat or kinuday, produced by the Ibaloy Indigenous Ethnic group in the Philippines. The saturation method was used to determine data sufficiency. Fifteen participants from the two Ibaloy-speaking municipalities of Benguet, Philippines served as the key informants for the study. Results show that Benguet native pork and rock salt are the usual raw materials for kinuday. Additionally, branches and trunks from locally available trees are utilized as smoking materials. Traditionally, meat is smoked on top of the cooking area called so-olan for one day, continuous to one month intermittent until fully consumed. Kinuday is attributed to the festivities performed by the Ibaloy IP group and the availability of the elements in producing the traditional food is the primary factor for continuing the practice. To ensure preservation and cultural transmission of traditional kinuday preparation practices, it is recommended that a formal documentary be developed and disseminated to various stakeholders.

**Keywords:** Ibaloy indigenous group, Traditional smoked pork delicacy (kinuday), Indigenous knowledge on meat smoking, Benguet, Philippines

## Introduction

Smoking is an ancient food preservation method that is not likewise new to the locals in the Cordillera. The practice of smoking meat emerged due to the traditional approach of slaughtering native pigs during festivities such as wedding celebrations, thanksgiving, and the start of another planting season, among others. Butchering animals, usually native pigs, is a tradition that everyone looks forward to, followed by a meal shared by the people in the community [1, 2]. Attendees usually bring home unconsumed meat served as their watwat or vatvat (chunks of boiled or raw meat given to every guest during the festivity).

For most tribes in the region, unconsumed meat obtained from festivities is hung in the kitchen and preserved by the smoke from the firewood while food is cooked. Smoking as a method of preserving food is likewise practiced by the Ibaloy Indigenous Peoples (IP) group, occupying the Southeastern two-thirds of Benguet province. The resulting smoked meat product is termed kinuday by the Ibaloy IP group. This native delicacy serves as a flavoring for various dishes such as pinikpikan, boiled legumes, and stir-fried vegetables. Kinuday provides a significant but controlled amount of protein to individuals [1].

Existing documentaries mentioned Ibaloy's traditions, beliefs, and material culture [2–5]. These documentaries mentioned butchering animals, primarily pigs, as a sacrifice to different gods. However, details on how the meats are prepared to remain undocumented.

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The gaps in the review prompted the need for a research-based documentary vis-à-vis the Ibaloy IP group's method of food preservation through smoking. The documentary will then provide authentic information that can be transferred through generations to sustain the continuity of a traditional practice.

This inquiry described the traditional practice in producing kinuday, which concentrated on the following points: first, raw materials used in the preparation of kinuday, which includes the kind of animal, meat part, ingredients added to meat, and ritual slaughtering practice. The ritual slaughtering practice is relevant in the study since KIs claim that the meat usually smoked is derived from a festivity. The second focus is on the smoking materials used. Third focus is on kinuday processing methods including the meat preparation before smoking, duration of smoking, and distance between the meat hanged and the source of heat. Finally, the characteristics of the smoked meat as perceived by the KIs.

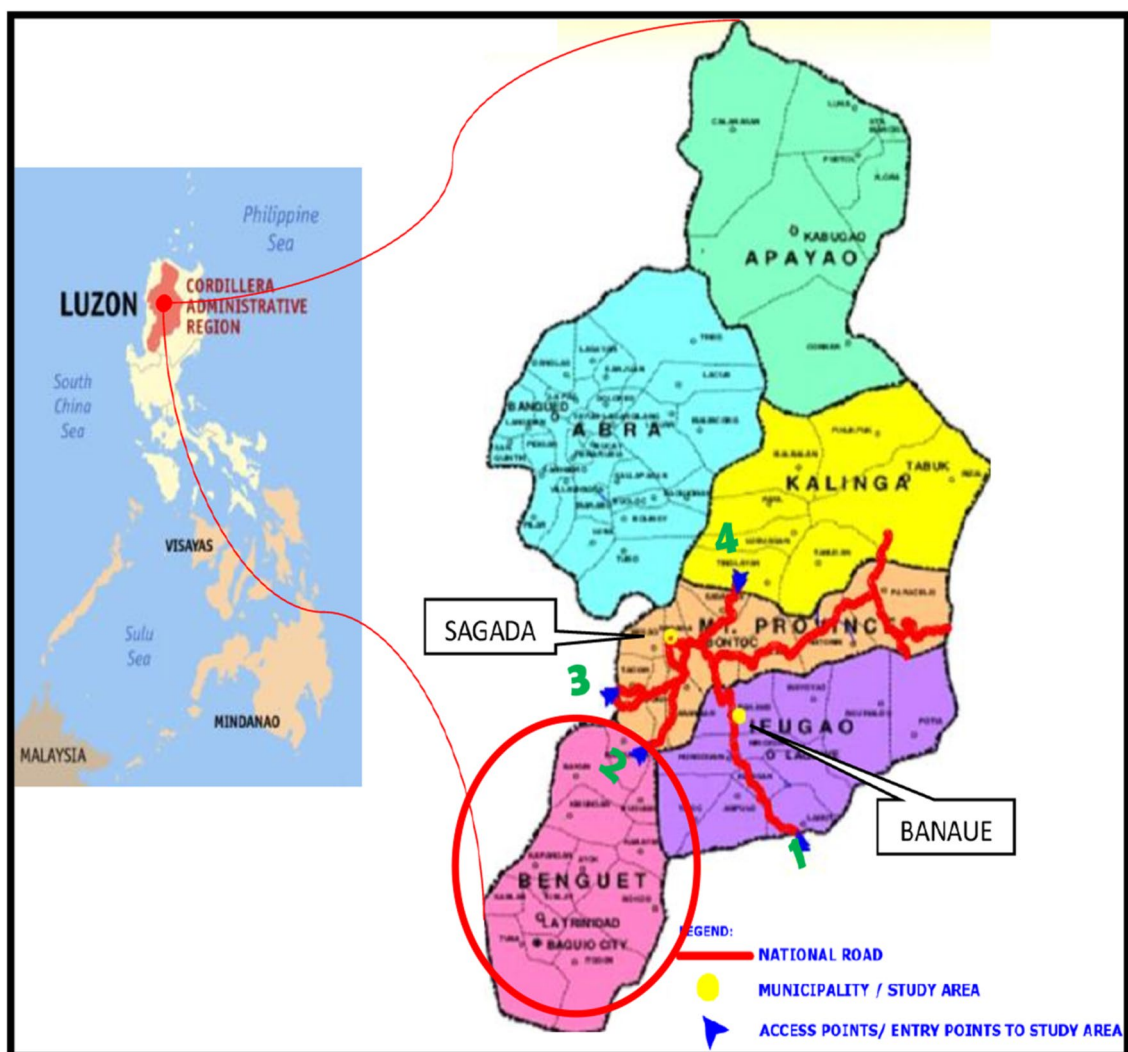
## Methods

### Research design

A qualitative research design was utilized to gather data on the traditional practices of the Ibaloy IP group in the preparation of kinuday.

### Sample and sampling procedure

Information in regards to the processing methods, materials, storage, and importance of smoked meat processing was accomplished by employing a non-probability sampling technique, specifically purposive sampling. Further, a saturation method was used to determine data sufficiency. Though the saturation method was employed, traditional processors were sourced out from the selected municipalities in the province of Benguet, Cordillera Administrative Region (CAR), Philippines. The target population was Bokod and Kabayan.



Source: <https://www.semanticscholar.org/paper/Planning-for-Sustainable-Access-of-Upland-Tourism-Fillone-Nicholas/f63fa9429209a86c75e7171389d140b3999cecf>

These municipalities satisfied the following criteria: (1) generally occupied by the Ibaloy IP group; and (2) considerably distant from the city or suburban communities. Fifteen (15) Key Informants from Bokod and Kabayan were selected since they satisfied the imposed criteria for informants as proposed by Tremblay [6].

Qualitative data were gathered through interviews coupled with observation with 15 Key Informants aged from 48 to 75. There were eight women, and, seven men interviewed belonging to the Ibaloy ethnolinguistic group. The Key Informants (KIs) are known for their role in the community either as Indigenous People Member Representative (IPMR), official, and elderly who observes the traditional Ibaloy ritual, ceremonies, and festivities. Moreover, all KIs have been producing kinuday for more than 20 years.

#### **Instruments**

A researcher-made semi-structured interview guide was used as an instrument during the interview process to gather data on traditional method in preparing kinuday. Prior to its use, it was pre-tested with respondents drawn from the target population. Other instruments utilized during the interview were interview and observation notes, recorder, and video camera (Sony  $\alpha$  6400; EPZ 16–50 mm F3.5–5.6 OSS) to record the interview and details of the process in preparing the Ibaloy smoked pork upon the consent of the Key Informant.

#### **Data gathering procedure**

Before gathering information, the proposal was subjected to ethics review (Code: 2019-011-Garambas-Kinuday). The researcher gathered information through key informant interviews and triangulated them through focus group discussion among processors and participant observation to fully capture the traditional kinuday making process. The key informants' consent was solicited using a consent form. For those key informants who cannot understand English or Ilokano, the questions were translated to their native language (Ibaloy) by the researcher, an Ibaloy, and a native of an Ibaloy community. The researcher arranged an interview, focus group discussion, and kinuday processing observation with the key informants in their respective homes or their natural environment.

#### **Data analysis approach**

Data from the interview notes and document reviews were subjected to thematic analysis, noting the frequently

mentioned traditional practices of smoking pork. Conventional or classical content analysis is deemed appropriate considering the expected data generated, nature of the study, and the inadequacy of documentaries regarding traditional smoking practices.

## **Results and discussion**

### **Raw materials in preparing kinuday**

#### **Specific kinds of animal used in making kinuday**

The key informants mentioned pig as one of the animals butchered and its meat utilized to prepare kinuday. DOST-PCAARRD (2016) dubbed the black pig raised in the province of Benguet as Benguet native pig with the following features: solid black coat, small erect ears, cylindrical snout, and straight tail. Such description coincided with the key informants' description of a native pig and added that the native pig is purely black, including the feet. Other kinds of animals mentioned by the KIs include cows, carabao, and horses (Table 1).

All respondents agree that meat from a native (black) pig or locally termed as *direm*, is primarily used as a raw material. The reasons for choosing native pigs include (1) its availability within the locality; (2) observation of traditional practice during festivities/rituals; and (3) preference due to its palatability factors compared to other animals. The choice for utilizing pork as a material in making kinuday is a wise preference for the Ibaloy IP group as NDAP (1998) elucidated that meat from hogs is more tender than other meats due to the circumferential arrangement of muscle fibers, including the amount and distribution of fat. On the same note, the popularity of hogs as sacrificial animals and their meat as food transcends to the current generation. Hogs, commonly used as sacrificial animals, are evident in the record provided by Moss [2]. The record shows that out of thirty-nine, twenty of the rites require hogs as sacrificial animals. These rites include: *bindayan*, *pachit*, *chawak*, *bayjok*, *batbat*, *saad*, *kapi*, *amdag*, *dosad*, *kolos*, *sabosab*, *diau kasib*, *gangau*, *tamo*, *padad*, *siling*, *okat*, *tabwak*, *kosday*, and *rawal ni payu*. Relative to the popularity of native pigs raised in the locality, native pigs can adapt to local environmental conditions, resistant to diseases, and the resulting meat has a unique texture and taste [7].

On the other hand, the meat from other animals for kinuday making like cow, carabao, and horse is less frequent and only utilized when the animal is strung up or lynched unintentionally. When this happens to animals, locals describe such incidents as *naiba'jat* or *ebalod*. Furthermore, cows, carabao, and horses as sacrificial animals are less frequent since these animals are considered farm animals. Accordingly, those in the upper levels of Ibaloy society slaughter these animals and preserve their meat through smoking. The KIs clarified that ritual animals

**Table 1** Raw material utilized by Ibaloy kinuday processors

Raw material in kinuday making		f n = 15	Traditional knowledge of kinuday processors		
			Explanation	Example of responses	English Translation
Kind of animal	Pig	15	Traditionally used during festivities/rituals	Sikato i shaha panpalti-a nuntan da nu waray okokasyon	It has been butchered since then if there are occasions
			Availability in the locality	Eshahel i baboy nuntan da shiyay dugad mi	Pigs were abundant in our place a long time ago
			Preference for its distinct smoked meat flavor	Mayat noman e baboy jen maekulay ta en- amis nu ekuday da ta mayat i kombinasyon ni namit, daman, tan bedat	Pork is a good choice for kinuday because it has more flavor due to the good combination of fat, lean, and skin
Other animals like cow, horse, carabao, wild animals, and even tilapia		12	Availability due to unintentional demise of an animal	Mi ha ikuday harajen klase ni animal nu nan- pusos shi pastolan	We smoke these kinds of animals when they are strung up or lynched unintentionally in the pasture land
			Availability of animals in the forest	Maikuday met laeng angken ngantoy klase animal ja meenopan	Meat from any kind of animal hunted from the forest can be smoked
			Customary practice, especially for rich hosts	Mepalti harajay jen klase nu peshit para shi nankebakang tan nu esespesyal jen okokasyon era	These kinds of animals are usually butchered during grand occasions hosted by affluent families
Breed of animal	Pig	13	Traditionally used during festivities/rituals	Sikato i shaha panpalti-a nuntan da	Such was butchered since then
			Availability	Hatan met i klase ni baboy i wara shiya dugad mi angken nuntan da pay. Niman bengat met jen waray empotin baboy	This kind of pig has been available in our local- ity ever since. It is only now that white breed exists
			Flavorful, especially when smoked	Nu hata entoling jen baboy, mayat noman namat to nu maikulay	Pork from a black pig is flavorful when smoked
White breed	Any breed for other animals like cow, horse, carabao, and other wild animals	2	Availability	Angken et nu empotin baboy basta nu ngan- toy wara jen klase	A white pig may be used, whichever is available
			Availability	Angken nganton klase weno kolor ni animal mebeddin ikulay basta ketdi wara	Any kind and color of an animal may be used, whatever is readily available
Age of animal	Pig	15	Native pigs grow at slower rate hence butch- ered when it is matured already	Paltien i baboy nu etaengan da et maymayat mowan nu etawenan da ta uutik ngay i nitib jen baboy	Pig is butchered when matured and even more a year because a native pig is small in size
			Tastier meat when smoked	En-amamis e etaengan jen baboy karkaro no ikulay mala	Meat from a matured pig is tastier, especially when smoked
			Uncertain	Nu naibajat shi pastolan e animal angken pigen bulan weno tawen to mala a	If unintentionally strung up or lynched in the pasture land, age doesn't matter anymore
Other animals like cow, horse, carabao, and other wild animals		12			

Table 1 (continued)

Raw material in kinuday making	f n = 15	Traditional knowledge of kinuday processors Explanation	Example of responses	English Translation
Sex of the animal Male or female	15	Availability	Bi-i man ono dahi, ensi met diperensya to. Basta ketdi nu ngantoy wara, sikato mala e mepalti tan maikulay	Female or male because there is no difference. Any available animal may be slaughtered then smoked

greatly depend upon the requirement of the village priest (mambunong) and ritual to be performed. The record provided by Moss [2] likewise mentioned buffalo as the sacrificial animal in the performance of the rite called kiad. In a global context, other cultures similarly utilize meat materials like pork, beef, camel, horse meat, chevon, yak meat, buffalo meat, and game birds in producing their indigenous salted/dried/smoked meat products [8, 9].

There is also a preference for the age when an animal is slaughtered. Most respondents estimated the age to be about eight months to three years, specifically for pigs, because native pigs grow very slowly compared to other swine breeds. For this reason, KIs stated that the measure of whether a pig can be slaughtered is through its size and not particularly the age. DOST-PCAARRD (2017) described that the body weight of mature male native pigs at eight months is 42 kg, while the female is about 38.20 kg.

As for other animals, the slaughtering age is uncertain because, accordingly, these animals are slaughtered and smoked due to accidents or disease. Regarding the gender of the animal, the respondents countered that a male or a female could be butchered. However, other respondents claimed that male animals have tougher and stinker meat, especially if the animal is not castrated. Their answers seem to contradict reports that female pigs had tougher meat than a castrated male pig (barrow) [10]. Furthermore, the gender of swine was found to have minor influences on meat quality and palatability, hence, male swine can be utilized as a meat source because of the reproduction advantages of female swine [11].

### **Ritual slaughtering practices**

Answers from the key informants are summed up to eight steps of ritual slaughter, specifically hogs (Fig. 1). The steps are: (1) tying the animal, (2) saying a short prayer, (3) stabbing, (4) singeing, (5) washing, (6) cutting into major cuts, (7) checking the condition of the bile, and (8) slicing into smaller cuts.

The first is tying the feet of swine using available material like straw or synthetic cord. The purpose of securing the feet of the swine is for easy transport and to restrict the animal's movement during the slaughtering process. The second step is performing a ritual or saying a prayer by an elderly or mambunong, which literally means 'the maker of prayer' [2] and [4]. After the ritual, locals, specifically, men, stab the animal using a wooden pin or peg just below the pig's shoulder to kill the animal as the pin directly targets the heart. The wooden pin or peg used in stabbing the animal and the practice of doing so is locally called owik. Informants claim that owik is a customary practice taught by their forefathers to kill the animal

slowly while letting the animal shriek for a little longer to invite the neighbors for a festivity. This wooden peg is made from any tree branch available, measuring about 16" long, cleaned then trimmed to create a pointed end. A guava branch or trunk is usually preferred and traditionally utilized as owik because it is not easily cracked while stabbing the pig.

Further, the guava branch has a disinfectant property to prevent meat contamination when stabbing the pig. In the absence of guava branches, pine tree branches may be used as owik.

There is a specific positioning observed when slaughtering the pig. The front body should face the entrance of the host's house while the head should be pointing to the east. Such a position of the animal during slaughtering shows reverence to the sun as the source of blessings. Giving reverence to the sun as the source of blessings is supported by Baucas [3], Moss [2], and White [5], explaining that the sun is considered as the abode of the Supreme God called Mongososchong and Kabunyan. Sacla [4] further explained an Ibaloy belief that the sun or agkew has the power of God and that the sun is God himself.

The next step is singeing using wood instead of the modern practice of using a blue torch to burn animal's hair. While singeing, a pile of grasses known as silver grass (*Miscanthus floridulus* Labill.) is arranged on the ground for the singed animal to lay and washed. The practice of using silver grass as a butchering mat, according to the KIs, has been a long practice of the Ibaloy IP group. After singeing, the animal is laid on the grass, washed then cut into major pieces. The head is separated from the whole carcass while the intestines are immediately removed and transferred in a basin. The liver and heart are also removed and segregated from other parts. An elderly or village priest, the mambunong will then check the animal bile. The fullness of the bile suggests the quantity of blessings awaiting the host. If the bile is empty, there is a need for the host to slaughter another animal because, accordingly, no blessings are in store for the host. This practice is perhaps derived from the understanding that even though a small organ in an animal's body, bile serves as a biological detergent that emulsifies and solubilizes lipids, hence, necessary for fat digestion. Therefore, the decrease in bile acid secretion is deemed to be associated with bacterial overgrowth in the small intestine, which causes infection [12].

After separating the internal organs from the carcass, large pieces of meat will then be transferred to a wooden table for further cutting. Pieces of meat are cut into chunks. During occasions, the chunks of meat are placed in a big iron vat filled with water and seasoned with salt, then boiled until cooked. Two to three pieces of cooked



**Fig. 1** Swine slaughtering process

meat chunks are served to attendees during mealtime, along with rice. The host intentionally reserves fresh meat, which will be distributed to the attendees after the occasion as a token.

#### ***Meat part used specifically in kinuday making***

Traditionally, any piece of meat composed of lean, fat, and skin may be smoked because when meat is given to

the attendees of occasions, the meat part is randomly picked (Table 2). Other informants mentioned using the belly or tenderloin because of the excellent interval of lean and fat. This observation by the KIs concurs with Garambas' and Balauro's [13] study that the belly part, specifically the bacon, is the most preferred meat part for hot smoking pork. Ratsimba et al. [8] also noted that

**Table 2** Meat part used in kinuday making

Meat part used specifically in making kinuday	f n = 15	Traditional knowledge of kinuday processors		English Translation
		Explanation	Example of responses	
Any part with fat lean, and skin	10	Uncertainty of meat supply acquired from an occasion	Nu waray watwat, aliven sikam memispis ni iahan sha jen afag	When a lump of meat is given, you are not allowed to choose the part of the meat that you like
Belly part or tenderloin	8	Good interval of fat and lean	Mayat noman ta sota proporsyon ni namet tan daman ket balans	The proportion of lean and fat is better and balanced
Fatty part with lesser portion of lean	3	Fat portion when smoked becomes tasty while the lean portion becomes tough when chewed specially when smoked excessively	Maymayat sota eshashahel i namit to ta en- amis nu mekhal-khal nu eshan ikulay mo i daman, edigat khal-khal to karkaro nu ebaybayag i kulay to	Part with a greater portion of fat is tastier because it can be easily chewed when smoked. If lean meat is smoked, it's difficult to chew, especially if smoked for a longer period

**Table 3** Ingredients in kinuday preparation

Ingredients added to meat prior to smoking	f n = 15	Amount	Traditional knowledge of kinuday processors		
			Explanation	Example of responses	English Translation
Rock salt	15	1–2 tbsp for every kilo of meat	Preserving agent	No waray asin to, eg masheshal shagos. Ngem aliva mangon eshahel asin to inges ni etag	If preserved with salt, it will not easily rot. But not too much salt like etag (smoked meat produced by other IP groups)
			Give flavor to meat	Say waray namat ni afag	To give flavor to the meat

the smoked meat produced in Nigeria and France utilizes pork belly strips to produce unam inung and boucane.

#### ***Ingredient added to meat prior to smoking***

All key informants mentioned using approximately 1–2 tablespoons of salt for every kilogram of meat (Table 3). Seemingly, salt is the only ingredient added to the meat that acts as a meat preservative and flavoring. KIs explained that salt is the only seasoning known since then to give taste to viands like meat and vegetables. The same reasons for using salt as a preserving agent are supported by Honikel [14], stating that salt is originally and traditionally used in curing unheated cuts of meat. Salt reduces water activity, prevents microorganism growth, prevents chemical spoilage, tenderizes meat fibers, and adds flavor to the meat. The amount suggested by the KIs is in accordance with the recommendation of Katz [15] that 1½–2 tablespoons for every pound of meat is generally a guide in the dry-salt method of curing meat. Moreover, Doyle and Glass [16] suggested 1.5–2.5% (w/w) as salt concentration to enable the protein to bind more

water, thus, increasing tenderness and decreasing fluid loss during processing.

For the Ibaloy IP group, the availability of salt as the sole seasoning known by forefathers has been utilized in food preparation and preservation. The addition of salt is likewise practiced by other cultures like in the preparation of salted/dried/smoked meat products across the globe such as kitoza in Madagascar, biltong in South Africa, kundi and unam ilang in Nigeria, and boucane in France [8]. However, one of the major distinctions of these traditional products, including kinuday is the ingredients added. Unlike kinuday, traditional salted/dried/smoked meat produced traditionally by various cultures around the globe is mixed with other ingredients other than salts like garlic, pepper, ginger, and other spices available in the region.

#### ***Smoking materials used in smoking kinuday***

##### ***Smoking materials in meat smoking***

There are two main types of firewood for smoking traditionally utilized by the Ibaloy IP group. These are (1) non-resinous and (2) wood from resinous, specifically pine

**Table 4** Smoking materials for kinuday preparation

Smoking Material	f n = 15	Traditional knowledge of kinuday processors		
		Explanation	Example of responses	English Translation
<i>Resinous Type (Softwood)</i>				
Pine Tree ( <i>Pinus kesiya</i> )	9	Transmitted practice	Sikato met i inturo ni apafo nontan da	It was taught by forefathers
		Available in the area	Eshahel eshan i pengdaan ni belbel ja mausal panduto	There are a lot of sources of pine trees used for cooking
		Dries meat intensely	Mag-anan ton shili i afag et maipreserb noman ni mebejag	Drying the meat thoroughly thus preserves the meat longer
<i>Non-resinous (Hardwood)</i>				
Alnus ( <i>Alnus japonica</i> )	10	Imparts pleasing aroma	Manseng-ew i afag jen nausal i alnus	Meat smoked using alnus is aromatic
		Penetrates thoroughly to meat fibers	Ebayag i asok tan aliven enshalang pilmi isunga mayat i sekep ni asok shi afag	The smoke lasts longer, and the fire is not robust; hence, smoke penetrates meat well
Guava tree ( <i>Psidium guajava</i> )	12	Acts as preservative	Mantulong jen ipreserb e afag	It helps in preserving the meat
		Acts as disinfectant	No usalen ket abulen to e pap-engat	It drives away flies when used
		Imparts pleasing aroma	Mansaseng-ew i ekuday shi bayabas	Meat smoked with guava is aromatic
Any broad-leaved tree specie	12	Penetrates thoroughly to meat fibers	Ebaybayag ngalab ni bayabas isunga diretso e asok ja manpreserb ni afag	Ember from guava tree; lasts longer hence the smoke continuously preserves the meat
		Available in the area	Eshahel i klase ni kadasan shi dugad tayo ja mebeddin usalen	Various types of kadasan are available in our place that can be used
		Practical since it can be used as firewood and smoking material	Eshahel i kadasan shiyay isunga isu met laeng e usalen mangikuday nu kita manduto ni mekan	Kadasan is abundant here; thus, it is used to smoke meat while cooking
		Imparts pleasing aroma	Manseng-ew i kinuday nausal i kadasan	Smoked meat using kadasan has a pleasant aroma
		Penetrates thoroughly to meat fibers	Tuloy tuloy i ngalab ni keyew et maymayat i resulta ni kinuday	Ember is continuous; thus, smoked meat is better
		Long-lasting smoke which represents longer life for the consumers of kinuday	Kaumbayag i asok to et kowan ni aapo da nuntan, iarig kono shi biyag ni too ta no mengan ni kinuday jen naasokan ni ebaybayag, kaumbayag kono kita shiya dubong	Smoke lasts longer and forefathers compared to human life that if kinuday smoked longer, our life here on earth

trees (Table 4). Non-resinous trees are from alnus (*Alnus Japonica*), edible fruit-bearing trees, and other types of trees belonging to broad leaves and mossy species, generally termed by the Ibaloy IP group as kadasan. The locals described kadasan as trees that may or may not bear wild fruits other than pine trees.

Meanwhile, trees that bear edible fruits such as guava, mango, avocado, and many others may likewise be utilized as smoking materials. One of the KIs explained that since the fruits of these trees are safe to partake, other parts are presumed to be non-toxic as well. Apparently, informants justified using these non-resinous types of trees available in the locality produces lasting smoke and impart pleasant flavor to smoked meat, while using pine wood imparts bitter, tougher, and darker kinuday. One

KI revealed that using non-resinous types of trees, specifically kadasan; for meat smoking represents long life because the smoke coming from these trees is long-lasting. Studies verified that hardwood, including fruit-bearing fruits, has lesser toxicity and is generally safer than softwood like pine trees [17, 18, 19]

The primary consideration for the choice of smoking material is its availability in the area. However, the informants voiced their thoughts about the better smoking material based on their prior experiences. One particular type of tree mentioned is alnus (*Alnus japonica*). According to the informants, alnus is particularly used in making kinuday because it imparts a pleasing aroma to the meat. Due to the slow fire and smoke it emits, thorough penetration of smoke to meat fibers is assured. The

informant's information concurs with the study on the standardization of etag; a generic term used to refer to the smoked meat produced in any parts of the Cordillera, using alnus as the smoking materials due to the flavor it contributes to the resulting meat [1, 13]. Furthermore, alnus or alder provides light smoke and imparts sweetness to meat [1, 20].

Another tree used and popular among the Ibaloy IP group is the kadasan. Since kadasan is a general term for broad leafy and mossy trees, respondents identified varied examples such as tikdek, bini, balante, lonohan, bal-tik, diwdi and the like. Kadasan is commonly used as firewood and smoking material for kinuday processing; hence, considered very practical for household kinuday producers. One popular tree considered as kadasan is the tibig or diwdi scientifically known as *Ficus nota*. This type of tree is endemic in the locality and has been used in the mummification process by the people in Kabayan, Benguet, because of its antibacterial properties that contributed to the preservation of Kabayan Fire Mummies [21].

Despite the verity that pine tree (*Pinus kesiya*) is a resinous type of tree and produces a rigorous or robust fire which may cause problems in the quality and safety of smoked meat (Marianski et al. 2009), the use of such in producing kinuday is still evident. According to the informants, there are two main reasons for using pine tree or Ibaloy IP group labeled it as belbel: (1) availability in the locality; and (2) a practice transmitted by forefathers. The informants, however, professed that using pine trees as smoking material yields three undesirable results associated explicitly with the meat texture, taste, and appearance. Due to the robust fire from the pine tree, the resulting meat dries intensely, resulting in a very tough texture. Further, the fire produced from the pine tree chars the meat rapidly, leaving a very dark meat surface. Such observation is likewise claimed by Sonido et al. [22] and further explained that the smoke generated from resinous wood or sawdust is sooty and strong-smelled.

## Kinuday processing methods

### *Meat preparation before smoking*

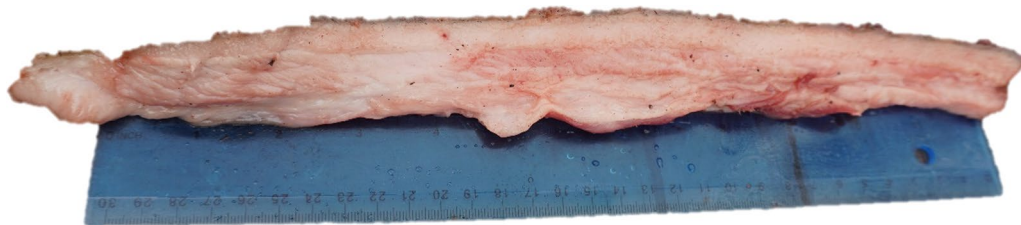
Derived from the responses of the key informants, before smoking, the pieces of meat generally passed through four steps (slicing, rubbing the meat with salt, stringing meat in a stick, hanging the meat on top of the cooking area (so-olan).

Most key informants mentioned that though meat acquired from rituals/festivities is already cut, slices are relatively thicker; hence, slicing into thinner pieces is necessary. Analysis from the individual responses of the informants divulged that the approximate thickness of meat ranges from  $\frac{1}{2}$ " to 2". Informants further explained that slicing into thinner slices is necessary to allow smoke to penetrate the inside portion of meat. On the other hand, the length can be as long as about 13" (Fig. 2), but the KIs emphasized that the length of sliced meat may depend on the size of the available meat ready to smoke.

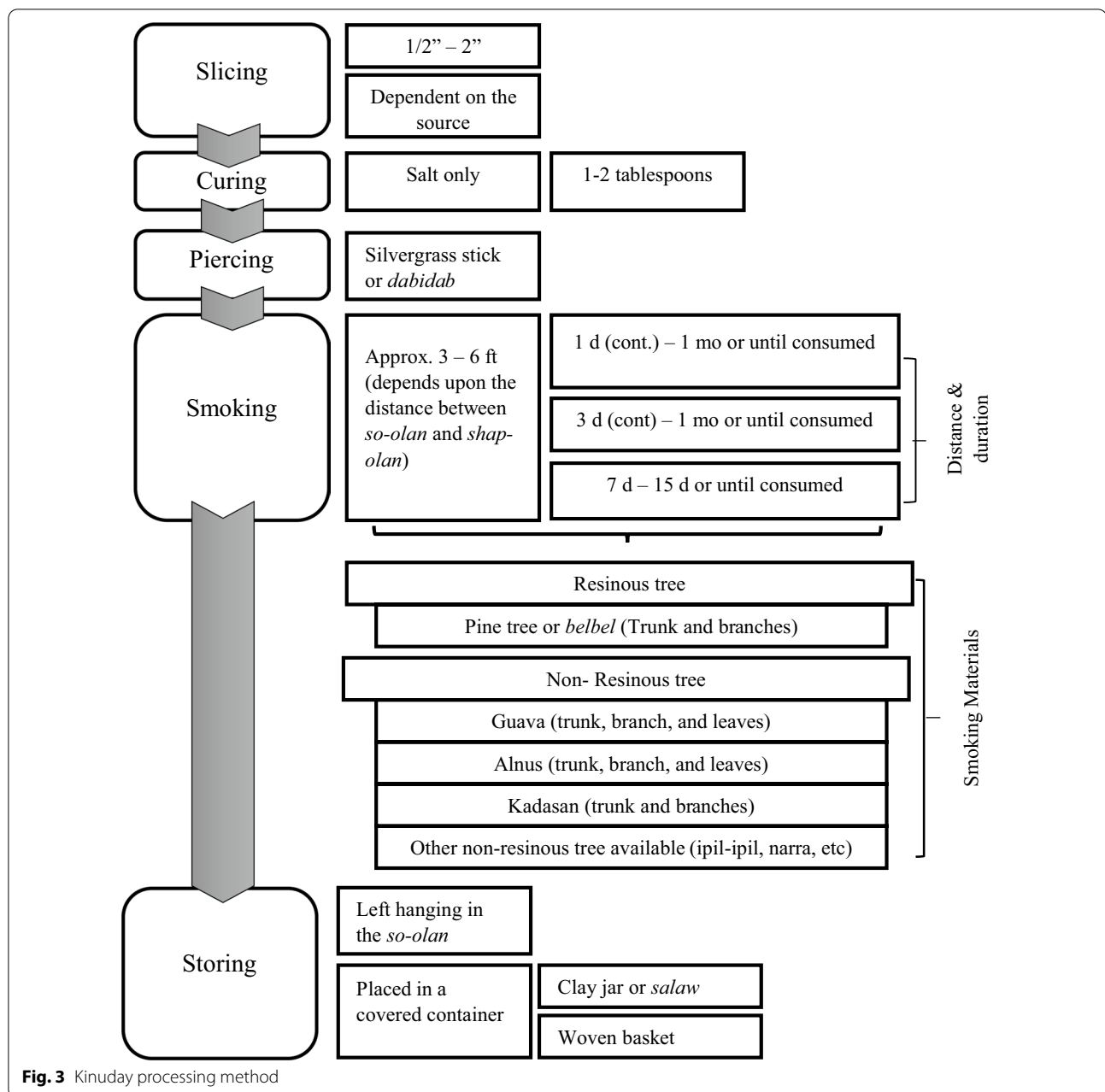
The second step is rubbing salt into the surface of the meat. Traditional kinuday making swerves to meat dry curing method because the meat pieces are smoked immediately after rubbing salt. Hence, penetration of salt into meat fibers happens along with the smoking process. The practice of the Ibaloy IP group deviates from the dry meat curing method described by Sonido et al. [22], which is to allow the salt to sit for a few days before the smoking process.

After curing, meat is stringed into a stick dubbed locally as paol, dabidab, and runo derived from silver grass (*Miscanthus floridulus* Labill.). Informants further explained that a stick is commonly used to pierce meat due to its availability in the area and that it is safer than using an iron rod. The piercing of meat is hanging in the so-olan, ready to be smoked.

After preparing meat, slabs or pieces of meat are immediately hung on top of the cooking area. A summary of the process is presented in Fig. 3. So-olan is an Ibaloy term referred to as the top portion of the cooking box called shap-olan [2, 5] referred to the shap-olan, a box made of wood filled with soil approximately 1 × 1 m in size and elevated about three feet from the floor, serving as a cooking area.



**Fig. 2** Approximate length of the meat to be smoked



### Duration of meat smoking

Analysis from the responses of key informants discloses that the smoking duration as practiced ranges from one day to three of continuous succeeded by intermittent smoking, which can be extended to one month (Table 5).

Key Informants explained that continuous smoking should be done until the smoked meat is dried or *emaganan*. KIs further explained that once the pieces of meat are not dried then intermittently smoked thereafter, the development of foul smell *en-akhob* will occur. After the meat is perceived to be dry already, intermittent smoking

can be employed until fully consumed. KIs likewise clarified that intermittent smoking is done during cooking time. Several studies recommended varying smoking duration because of the findings that smoking causes contamination of food items exposed to smoke such as formaldehyde, heterocyclic amines, and polycyclic aromatic hydrocarbons (PAHs) [18]. The standardized etag, a Cordillera pork-based native delicacy, is smoked for 16 h or two days at a high temperature range of 71–79 °C [23, 13]. Ibarra [24], on the other hand, suggested that smoking should not last longer than four days to prevent

**Table 5** Meat smoking duration

Traditional knowledge of kinuday processors		
Smoking Duration	f n = 15	Explanation
Example of responses		
English translation		
1 day (continuous)–1 month (intermittent) or until consumed	4	Once the meat is smoked for a day, the meat can be consumed already, and the left-over meat will continuously be smoked intermittently until consumed
3 days (continuous)–1 month (intermittent) or until consumed	5	3 days of continuous smoking will dry the meat well then can be smoked intermittently thereafter after a month or until consumed
7–15 days	6	7–15 days of continuous smoking assures dryness of product. Desirable smell and taste will be assured. If smoking is extended, the smoked product tends to become very tough

If continuously smoked in one day, it can be consumed already. If there is smoked meat left, it will be smoked further even for a month or until consumed

It's better if it is smoked for even three days until dried thoroughly and if there are extra, it is smoked while cooking until consumed

If smoked for seven days until 15 days, the meat is thoroughly dried already, and it will not develop a foul smell, and it will be tastier. If smoked for a longer period, the meat becomes tough

the production of pyrolygneous acid that is detrimental to one's health. This claim is supported by Hokkanen et al. [25] particularly reported that meat samples exposed to smoking for more than five hours obtained higher BaP and PAH4 concentrations. Puljic [26] likewise reported that meat samples subjected to 20 h of traditional smoking (6–8 h for six days and every 2–3 h for the next 14 days) highly exceeded the maximum limits set by EU regulation No835/2011 (12ug/kg) by up to 10 times.

#### **Distance between the hanging meat from the source of heat**

Based on the responses and ocular assessment, the distance from the heat source, the shap-olan and the suspended meat in the so-olan ranges from three to six feet high. According to the informants, such distance prevents excessive cooking and charring of the meat being smoked. Moss [2] and White [5] described shap-olan as a cooking box elevated about three feet from the floor, and the so-olan is situated a few inches from the ceiling. The mentioned authors did not provide the distance between the so-olan and shap-olan. Hokkanen et al. [25]

recorded that meat samples smoked less than the five-meter distance between meat and heat source generated greater PAH concentrations while meat samples smoked in a chamber higher than 5 m generated lesser PAH concentrations.

#### **Characteristics of kinuday**

The characteristics of kinuday as described by the key informants vary due to the two main factors: (1) smoking duration; and (2) smoking material used (Table 6). The responses gathered obtained organoleptic qualities of the resulting meat, such as taste, aroma, color, and texture. Concerning the general description in terms of taste, informants described kinuday in two ways: mansep-it and enmalamnam, meaning saltiness is just right and tasty, respectively. The minimal addition of salt and the limited time for curing brings about the mansep-it taste characteristic.

Meanwhile, the tasty quality of kinuday is due to the mix of the natural taste of meat, salt, and smoke transmitted to the meat. Specifically, the respondents describe kinuday as smoky, meaning the smoke generated from

**Table 6** Kinuday characteristics as affected by smoking materials used and smoking duration

Smoking Material	Smoking Duration	f n = 15	Traditional knowledge of kinuday processors		
			Explanation	Example of responses	English Translation
Resinous	Less than 15 days (shorter duration)	10	Very dark (fat, lean, and skin)	No belbel usalen, angken ikulay ni pigen akhew bengat, singen esegseg mala	If pinewood is used, the meat is intensely smoked, even smoked for a few days
		10	Tough	Endayot khal-khalen	Difficult to chew
		10	Intense smoke aroma	Naasohan pilmi akob to	The smoke smell is intense
	16 days and above (Longer)	2	Intense smoky taste with a bitter aftertaste	Naasok pilmi tan empapait namat to	Smoked intensely accompanied by a bitter taste
		15	Extremely dark (fat, lean, and skin)	Entoling pasiya	Very dark
		15	Extremely tough	Singen bato mala	Just like stone
		15	Burnt	Esegseg ni pasiya	Burnt
		15	Burnt taste with bitter aftertaste	Esegseg tan empait namat to	Burnt and bitter
Non-Resinous	Less than 15 days (shorter duration)	13	Dark Brown (outer) Whitish to reddish (inside)	Entotoding e itsura shi awas to ngem empopotan binmalenged sekep depende shi kabayag ni pan smoke	Dark brown appearance on the outside but cream and reddish inside depending upon the length of smoking
		14	Firm	Makneg	Tough
		15	Distinct smoke aroma	Naasohan akob to	Smoky aroma
		15	Not salty with smoky taste	Mansep-it ta kombinasyon ni uston asin tan asok	Tasty because it's the combination of enough salt and smoke
		15	Dark Brown (outer) Dark red (inside)	Entoling itsura to tan embalenga shi naidaem	Dark and reddish inside
	16 days and above (Longer)	15	Tough	Makneg shili	Very tough
		15	Distinct smoke aroma	Epigpigsas i naasohan jen akob to	More intense smoke aroma
		15	Not salty with more intense smoke taste	Mansep-it ngem epigpigsas namat ne asok	Tasty but more intense smoke flavor

any smoking material rendered the distinct smoky taste. In terms of the smoked meat's aroma, though it is specifically identified as smoky aroma, key informants described the aroma as manbebangdo or mansasengew meaning aromatic or pleasant smell, in general. The described aroma of the kinuday is attributed to the smoke from the burned smoking materials. The color of the resulting meat, on the other hand, is described as ettotoding, denoting a brown to the dark brown outside surface, while binmalenga means reddish for the inner portion of the smoked meat. The fatty portion of kinuday is described as empopoti and refers to whitish and shoyaw to yellowish color. Radovic et al. [27] cited that the phenolic components of the smoke from burnt wood contribute to the flavor of the resulting meat. In terms of color quality, Issenberg and Lustre [28] affirmed that the smoked lean meat smoked for 10 h is brownish-red while the fat is yellowish. As to the texture, the smoked meat is described to vary from firm to tough depending upon the smoking duration and smoking material utilized. Informants made clear that the longer the smoking duration, the tougher the meat will become, while a resinous type of tree used in smoking greatly toughens the meat as meat is dried exhaustively due to the intense heat produced.

## Conclusions

The traditional preparation of kinuday is deeply anchored to festivities performed by the Ibaloy IP group. Essentially, availability of materials including the native pig and smoking materials as well as the faithful transmission of traditional knowledge through generations have contributed to the perpetuation of the kinuday preparation practices even in the current times. Documentation of traditional processing methods viewed in the perspective of the community and its culture should be continually done to ensure its preservation and cultural transmission.

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## Author contributions

CDGarambas was involved in the conceptualization and design of the study, acquisition of data, analysis and interpretation of data, drafting the manuscript, and revising the manuscript. MBZLuna and CTChua, on the other hand, were involved in the design of the study, analysis and interpretation of data, and revision of the manuscript. All authors read and approved the final manuscript.

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## Availability of data and materials

The data supporting the findings can be freely and openly accessed in the following sites:

- <http://www.pcaarrd.dost.gov.ph/home/portal/index.php/quick-information-dispatch/2971-r-d-activities-to-improve-native-pig-production>
- <http://www.pcaarrd.dost.gov.ph/home/portal/index.php/quick-information-dispatch/2971-r-d-activities-to-improve-native-pig-production>
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- <https://www.sciencedirect.com/science/article/abs/pii/S0308814608002987?via%3Dihub>
- <https://www.hindawi.com/journals/jchem/2018/2160958/>
- <https://pubs.acs.org/doi/abs/10.1021/jf60172a009>

## Declarations

### Ethics approval and consent to participate

The study protocol and methodology was approved by the Department of Science and Technology—National Ethics Committee (DOST-NEC) in the Philippines (NEC Code: 2019-011-Garambas-Kinuday). All the Key Informants gave a written informed consent.

### Consent for publication

Agree to conditions of publication set by the Journal.

### Completing interests

The authors declare that they have no competing interests.

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