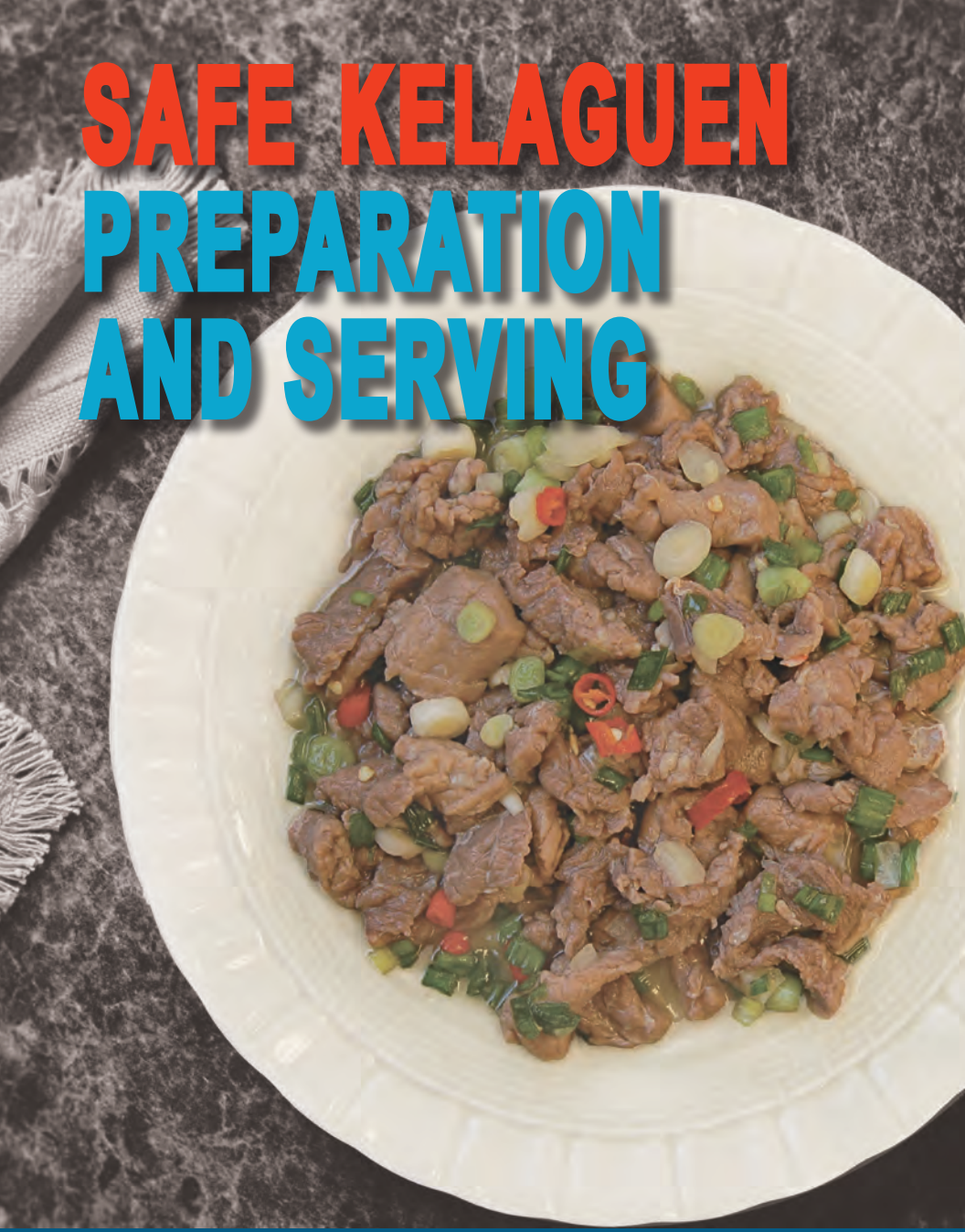
# SAFE KELAGUEN PREPARATION AND SERVING



**University of Guam**
**Cooperative Extension Service**

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Kelaguen is a unique and delicious Chamorro meat or seafood dish that has been served on Guam for generations. Unfortunately, according to the Guam Public Health and Social Services, kelaguen is one of the leading causes of foodborne illness on Guam. The estimated number of foodborne illnesses associated with kelaguen on Guam exceeded 1,000 cases per year. About 83% of foodborne illnesses associated with kelaguen occurrs in private homes. Cases of foodborne illnesses associated with chicken kelaguen is about 4-6 times more than shrimp or fish kelaguen.

## Foodborne illness

Foodborne illnesses are caused by pathogens present in foods consumed by people. Pathogens are disease-causing bacteria, viruses, and parasites. Illnesses can also be caused from toxins, which are produced by bacteria, plants, fish, and animals. The typical symptoms of foodborne illness are nausea, abdominal pain, vomiting, diarrhea, fever, headache, and tiredness. Foodborne illness also can result in permanent health problems such as kidney failure or even death, especially to people from high risk populations, which are the very young, elderly, pregnant, seriously ill, or those with weakened immune systems.

## Improper handling during kelaguen preparation and serving

- Kelaguen is often prepared with raw or partially cooked meat to achieve a more tender texture and a desired taste. Pathogens however, on raw or undercooked meat pose a high risk of foodborne illness, so kelaguen is risky unless it is made with fully cooked meat.

- Kelaguen involves a lot of cutting and chopping of foods, including meats. Unless care is taken to keep everything clean, it is easy to contaminate the prepared kelaguen.

- Kelaguen is frequently subjected to temperature and time abuse when served at parties and fiestas. If food is kept at the temperature danger zone (between 40° and 140°F) for more than 4 hours, pathogens can grow and multiply to a high number or produce toxins in the food, which will make people sick.

### Causes of kelaguen foodborne illness

- Using raw or partially cooked meat or seafood for kelaguen.
- Contamination of kelaguen from dirty hands, knives, cutting boards, etc.
- Holding kelaguen at warm (room) temperature during serving and storage.

## Prevention of foodborne illness from kelaguen.

- Pathogens in raw meat must be killed;
- Hands and all equipment used in kelaguen preparation must be kept clean; and
- Pathogen growth during service and storage must be controlled by either refrigeration or acid.

## Kill pathogens in raw meat

- Cook meat to a required internal temperature (Table 1).
- Blanch (boil) meat, shrimp, and fish in boiling water for 1-2 minutes.

**Table 1 - Recommendations to kill pathogens in raw meat and seafoods for kelaguen preparation. Use one of the following methods to prepare meat and seafoods for kelaguen**

| Heat Treatment | Chicken | Beef | Shrimp | Fish |
|---|---|---|---|---|
| Cook* | 165°F** | 145°F | 145°F | 145°F |
| Blanch *** | N/A | 1-2 minutes | 1-2 minutes | 1-2 minutes |

**: cooking methods include grill, barbecue, bake, broil, or boil.*
***: use a food thermometer to check the required internal temperature for safety.*
****: put sliced meat (0.2-0.4 inch in thickness) or shrimp in boiling water for 1-2 minutes.*

## Prevent pathogen growth

- Keep kelaguen cold (at or below 40°F) during storage and service, or.
- Use lemon juice or powder to acidify kelaguen if it served and/or stored in the temperature danger zone (between 40° and 140°F) for more than 4 hours.The amounts of lemon juice and lemon powder required to adequately acidify kelaguen are recommended in Table 2.

**Table 2 - Amount of lemon required to acidify kelaguen for serving at in the temperature danger zone for more than 4 hours**

| Recommendation | Types of Kelaguen | | | |
|---|---|---|---|---|
| | Chicken | Beef | Shrimp | Fish |
| *I. Both lemon juice and powder** | | | | |
| ½ cup (juice) and 4-½ teaspoons (powder) | 1.6 lb meat** or 5.0 cup klg*** | 1.6 lb meat or 6.0 cup klg | 1.5 lb meat or 5.0 cup klg | 1.5 lb meat or 4.5 cup klg |
| *II. Lemon juice* | | | | |
| 1.0 cup | 1.1 lb meat or 3.5 cup klg | 1.0 lb meat or 4.0 cup klg | 0.8 lb meat or 3.0 cup klg | 1.0 lb meat or 3.0 cup klg |
| *III . Lemon powder* | | | | |
| 1.0 package or 10 teaspoons | 2.3 lb meat or 7.0 cup klg | 2.3 lb meat or 9.0 cup klg | 2.1 lb meat or 7.3 cup klg | 2.1 lb meat or 6.3 cup klg |

**: powder, Yours Lemon Flavored Powder, Yands Trading Co., Ltd, Japan.*

***: meat: pounds of raw chicken, beef, shrimp and fish for kelaguen.*

****: cup klg: cups of prepared kelaguen.*

# Safe Kelaguen Preparation

## *Purchase meat and ingredients*

- Only purchase food from reliable sources and reputable suppliers.
- Determine quality by checking appearance, smell, and texture.
- Store perishable ingredients, such as meat and seafood, in the refrigerator or freezer.

## *Sanitize dishes, utensils, and surfaces*

- Soak dishes and utensils in a solution (1 tablespoon of chlorine bleach per gallon of water) for 5-10 minutes. Drain and air dry before use.
- Spray or wipe down cutting boards and food contact surfaces with a bleach solution (1 tablespoon of bleach per quart of water). Leave the bleach solution on for at least 2 minutes. Rinse and air dry before use.


## *Clean your hands and the cooking area*

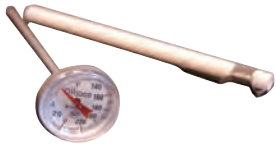
- Before handling foods, wash hands thoroughly with soap and warm running water. Bandage cuts and burns on your hands.
- Clean and sanitize utensils and food contact surfaces in the kitchen.
- Wash your hands after you touch raw meats or when you feel your hands are contaminated.

## *Avoid cross-contamination*

- Wash, rinse and then sanitize cutting boards and knives after preparing uncooked foods.
- Never cut raw meats and then raw vegetables with the same knife and cutting board without washing the knife and cutting board between each use.

## *Prepare meat*

- Thaw meat either in the refrigerator or under running water.
- Cook meat sufficiently to kill pathogens.



  * Cook (barbecue, bake, broil, or boil) to a safe internal temperature at 165°F for chicken and 145°F for beef, shrimp, and fish. Check the temperature with a thermometer; or.
  * Blanch the sliced beef, shrimp, or fish in boiling water for 1 to 2 minutes.

## *Season*

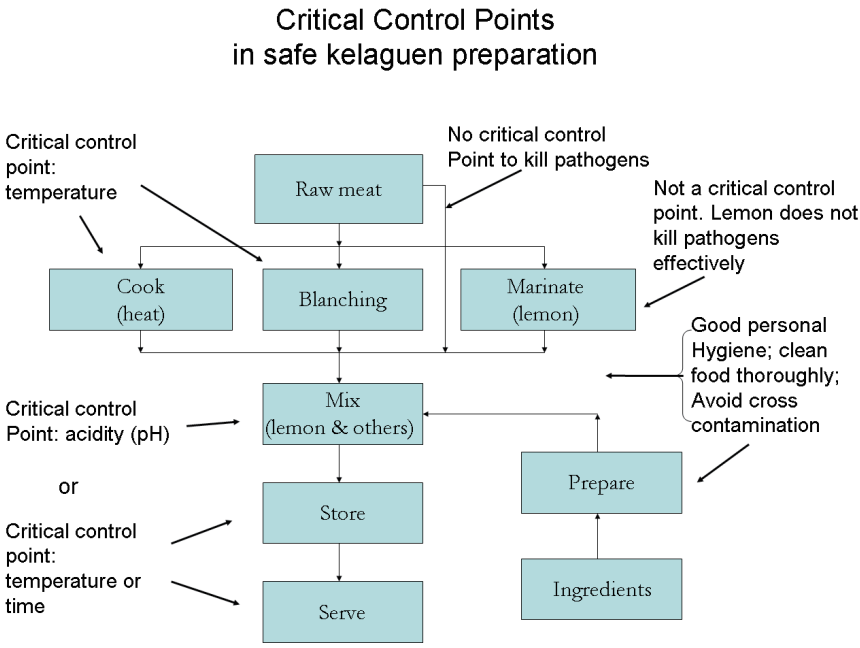
- Add other ingredients to the cooked meat.
- Add lemon
  * If kelaguen will be consumed within 4 hours after preparation or kept cold (below 40°F) before consumption, add any amount of lemon according to your taste preference.
  * If kelaguen will be served at room or outdoor temperatures for more than 4 hours, add the amount of lemon recommended in Table 2.
- Mix the kelaguen with utensils instead of with your hands.

## *Store and serve kelaguen*

- Store the kelaguen in the refrigerator and serve the kelaguen in an ice bowl at parties or fiestas.
  - * An alternative way is to put kelaguen in small bowls for serving and replace the bowls every four hours.
- If the recommended amount of lemon is used (see Table 2), kelaguen can be safely served at parties or fiestas without taking care with the length of time that kelaguen is not refrigerated or iced.
- Kelaguen prepared with raw meat, such as raw fish or beef, or partially cooked meat should not be served to high risk populations, which includes young children, elderly, pregnant women or those who are seriously ill or with weakened immune systems.

## *Handle leftovers*

- Throw away leftover kelaguen if it has been served and stored at a temperature between 40° and 140° for more than 4 hours (unless the kelaguen has been acidified with the amount of lemon listed in Table 2.




## *Description*

- Cooking and bleaching are critical control critical control points to kill pathogens.
- Adding lemon, keeping kelaguen cold, or controlling time within four hours is critical control point to prevent harmful bacterial growth to cause people sick.

## *Marinating*

- Marinating raw meat in lemon is not a critical control point to kill pathogens on raw meat.

## Five key food-handling practices

In addition, to prevent foodborne illness, it is essential to observe the following proper food handling practices during kelaguen preparation.

1. Practice good personal hygiene.
2. Cook foods adequately.
3. Avoid cross contamination.
4. Keep foods at safe temperatures.
5. Avoid unsafe or high risk foods.

## Summary

To reduce the risk of foodborne illness, kelaguen should be prepared according to the following recommendations:

- Cook or blanch meats to kill pathogens as recommended in Table 1.
- Avoid using raw or undercooked meats to prepare kelaguen.
- Keep kelaguen cold if it will not be eaten within 4 hours of preparation.
- For kelaguen to be safely served at parties or fiestas without time and temperature control, add an adequate amount of lemon, as recommended in Table 2.
- If kelaguen is prepared with raw meat, such as fish, the kelaguen should not be served to high-risk populations.

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**SAFE KELAGUEN PREPARATION AND SERVING**

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