

Original Research Article

The Effect of Smoking Durations on pH and Sei Meat Protein

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Abstract: The study aims to know the influence of smoking time using bio briquettes leaf kesambi torrefied on pH and meat protein content sei cow. The study used a design complete with a duration of smoking 60 minutes, 90 minutes, and 120 minutes. piece meat weighing 8 kg sliced transverse 2-3 cm thick and soaked in a mixture of 16 grams of salt, 2.4 grams of saltpetre, and 2 cloves of onion white. The meat was then soaked for 2 hours inside a sokal (a basket made of palm leaves) and closed thermocouple meat entered into in meat for measuring internal temperature. Temperature room smoking guarded between 100°C and 150°C, monitored by 4 thermocouple sensors. The internal temperature of meat was monitored between 63°C and 77°C. Analysis variance shows that old curing is influential on the pH and protein content of meat sei cow. The highest protein value was found in the long smoking treatment of 60 minutes (26.13%), different real with the long smoking treatment of 90 minutes. Duration Smoking also affects pH parameters. The pH value of the 60 minutes smoking treatment (7.10) was different real with longer smoking treatments 90 minutes and 120 minutes. Treatment best is the long smoking time of 60 minutes which produces the highest protein content of 26.13% with a pH of 7.10.

Keyword: Cooking Time, Kesambi Leaf Biobriquette, Protein, pH, Sei.

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INTRODUCTION

The study aims to know the influence of smoking time using bio briquettes leaf torrefied kesambi on the pH and protein content of meat sei cow. Smoking is a method traditional in processing meat that gives the product a unique taste and aroma end. Whereas biobriquettes leaf kesambi torrefied is material the resulting fuel through processing leaf kesambi. Effect of smoking time use bio briquettes leaf kesambi torrefied on pH and meat protein content beef is necessarily researched Because can result in change characteristic chemistry and protein composition of meat consequence interaction of the smoke produced from the smoking process. briquettes bio leaf kesambi and meat.

Besides providing the ninth essential amino acid, meat animal is a complete food protein source and source of good fatty acids, vitamins, and minerals (Pereira & Vicente, 2013). In addition, compared with vegetable protein, animal protein increases satiety and increases expenditure energy and fat loss (Gilbert *et al.*, 2011). According to Albracht-Schulte *et al.*, (2021), protein is very important for health man Because gives

nutrition, function, and quality biological. According to Nithyalakshmi and Preetha (2015), smoked food is a source of good and safe omega-3 fatty acids in food. According to Millward *et al.*, (2008), evaluation thorough internal protein quality food also considered the content of amino acids, power digest, speed of protein digestion, and possibilities of formation of active peptides in a manner physiological. Animal protein contains the ninth essential amino acid needed by a human. In addition to vitamins, especially B vitamins, and minerals like copper, manganese, zinc, and iron (Friedman, 1996), meat red is a source substance iron heme, which has bioavailability more high (i.e., absorption) compared to substance non-heme iron was found in meat Plants (Biesalski, 2005).

PH is an important parameter in characterising quality meat. Changes in pH can affect the stability, lifespan, and properties of organoleptic meat. Smoking with bio briquettes leaf burnt cassava potentially affects changes in meat pH as a result exists interaction chemistry between smoke components with meat.

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Protein is one of component main meats of the sei cow. The effect of smoking time use of bio briquettes leaf kesambi on meat protein content needs studied due to the smoking process can change the characteristic physiology and chemistry of proteins. Change can affect mark nutrition and texture of meat, as well as protein availability to consumers.

Studies previously show that the influence of smoking time with the use of material different burn can affect the pH and protein content of various types of meat. However, the effect on meat sei cows that use bio briquettes leaf burnt cassava needs researched more. In the study of diluted liquid smoke from shell coconut, level more dilution low it turns out to have more influence significant to characteristic physical, chemical, and sensory meat cows, except water and protein content (Yusnaini *et al.*, 2012). With salting, smoking, and drying meat, the number of microbes generally decreased, however microorganisms halophilic increased (Dzudie *et al.*, 2003). High protein content ($36.66 \pm 0.61\%$) and crude fat content low ($9.46 \pm 0.98\%$) were reported for smoked beef, together with essential minerals, with potassium having essential mineral concentrations highest (444.76 ± 23.18 mg/100g), and Mn 0.18 ± 0.05 mg/100g (Ajai *et al.*, 2019). Different smoke compounds absorb water and fat differently (Martinez & Machado, 2016).

Changes in pH can show changes in quality and age save meat, meanwhile, protein changes can affect texture, value nutrition, and protein absorption by the body. Effect of smoking time use bio briquettes leaf kesambi on pH and protein content of meat sei cows also have implication important aspect sensory. Changes in pH can affect the taste and properties of organoleptic meat, meanwhile, protein changes can affect the texture and softness of meat. Information will guide the producer in choosing the duration of proper smoking with the use of bio briquettes leaf burnt cassava to achieve the desired pH and protein content in the product meat sei cow.

Studying it also delivers benefits practical for consumers. With the know influence of smoking time use biobriquettes biobriquettes leaf kesambi, consumers can choose product meat beef sei with the appropriate pH and protein content with likes and needs. Utilization of bio briquettes leaf kesambi as material burn smoking can become a friendly alternative environment and potentially reduce the use of material burn fossils. Study this contribution to understand the influence of smoking time use of bio briquettes leaf burnt cassava on the pH and protein content of meat sei cow.

MATERIALS AND METHODS

Research Materials

Materials used in study this is meat fresh beef (muscle biceps femoris) of 8 kg obtained from Cattle Slaughterhouse Bimoku and biobriquettes leaf kesambi sor smoking meat. Equipment used including tools grill

sei meat, thermometer, stopwatch, scales, packaging plastic, and quality test equipment. The study will be held in May 2023 at the Laboratory Processing Faculty Technology Artha Wacana Christian University Agriculture. Organoleptic test carried out in the Laboratory Processing Faculty Technology Artha Wacana Christian University Agriculture Kupang, analysis of quality product meat sei cattle carried out in the laboratory Biosciences.

Experimental design

Draft random completion was used in a study, with three durations of smoking: 60 minutes, 90 minutes, and 120 minutes.

Procedure Preparation Sei's meat

Steps following followed for preparing sei meat: Wash meat until clean with clean water. Cut/slice 8 kg of meat in opposite direction fibre becomes sliced 2-3 cm wide, thick uniform, and no broken 50 cm long. Mix 16 g table salt, 2.4 g saltpetre (equivalent to 300 mg/kg of meat, as used in the study), and 2 cloves of onion white. Coat meat with salt and onion mixture white. Shut up meat for 2 hours inside Sokal (basket palm leaves) covered paper tissue. Prepare room smoke and position the thermocouple and thermometer in the location that has been determined. Turn on bio briquettes leaf kesambi until into hot coals and place it in the bottom room smoking. Enter the thermocouple meat to measure the internal temperature of the meat. Put slice meat on top rack grill metal covered with aluminium foil. Customize duration smoke by order experiment. Smoked/ grilled meat, turn over every 30 minutes. Add more Lots briquettes moment temperature down up to 100°C keep it up temperature room smoking between 100°C and 150°C . Temperature is monitored using four thermocouple sensors placed in the chamber smoking, next to the embers, below the meat, above the meat, and in the chimney. A thermometer was placed on the wall for lower room smoking, before meat, and in the chimney. The internal temperature of meat observed uses a thermometer, ranging between 63°C to 77°C . After Sei meat is ready, cooled and packaged for analysis more continue.

Research Parameters

Protein Content (%)

Kjeldahl flask 30 ml holds sample 0.2 grams of ground smooth. The next step is adding 2 g of catalyst and 2.5 ml of concentrated HCl. boiling material from One to half an hour produces fluid clear. Pumpkin with contents cooled before being moved to tool distillation, then combined with 15 ml of 40% NaOH solution and rinsed with distilled water. Below condenser laid Erlenmeyer flask containing 0.02 N HCl and 2-4 drops of indicator added. The indicator is 0.02% methyl mixture red in alcohol and 0.02% methyl blue in alcohol, with a ratio of 2:1. Stuffed pumpkin HCl solution should filled with an end tube open condenser.

$$\text{Protein Content (\%)} = \frac{(A - B) \times N \times 0.014 \times 6.25}{\text{Sample Weight (g)} \times 100\%}$$

Note:

- A = ml of NaOH used For titration blank
- B = ml of NaOH used For titration sample
- N = Normality of NaOH

pH testing

pH testing was carried out using a Hanna pH meter. Weight sample 10 grams weighed and ground use mortar and pestle, add 100 ml of distilled water for One minute. Before measurements, electrodes were rinsed with distilled water and dried with paper tissue If use water. The pH meter is calibrated using pH 4 and pH 7

buffers. Electrodes were soaked until stable readings and on-screen pH readings were noted.

RESULTS AND DISCUSSION

Protein content

Analysis results variance (ANOVA) shows that long curing treatment influential real ($P < 0.05$) to see meat protein content. In Figure 1 Duncan's post hoc test shows that a long smoking treatment of 120 minutes produces the highest protein content (26.13%), no different real with a long smoking treatment of 60 minutes However different real with a smoking duration of 90 minutes. treatment. The lowest protein content was obtained in the long smoking treatment of 90 minutes (21.67%), no different real with the long smoking treatment of 60 minutes.

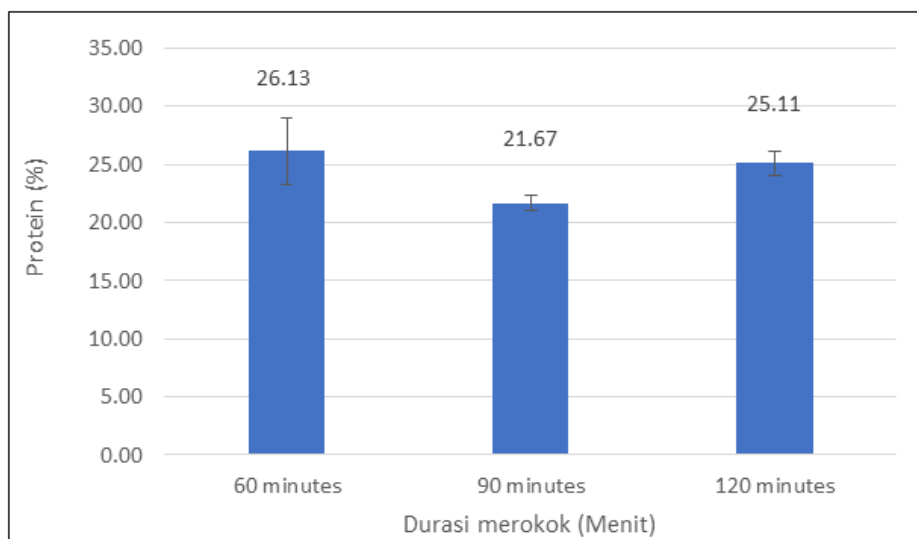


Figure 1: Changes in protein during the smoking process se'i

In essence, smoking can cause loss of water and subsidence total weight of meat, so increases the percentage of relatively deep protein meat. However, by no means does protein content in meat increase. When the meat is processed through smoking for a long time, water inside the meat will evaporate, so heavy meat will reduced. this causes an enhanced percentage of non-water components of meat, including protein. In this case, the percentage of protein in meat looked to increase Because decreased the total weight of the meat. However, the actual protein content in meat is still relatively constant or even possibly decreases in several cases, depending on the conditions of smoking.

Enhancement percentage of protein in meat consequence of prolonged smoking no enhancement protein quality however only change relative to the composition of meat consequence loss of water. Content nutrition Actually Can just decrease during the smoking process, especially if damage or significant protein denaturation.

Difference meat protein content of smoked sei beef for smoking times of 60 minutes, 90 minutes, and 120 minutes use of biobriquettes leaf torrefied kesambi can caused by several factors like protein denaturation, reactions chemistry at the time of smoking, level drought sei meat, and ratio carbohydrate to the inner protein meat. Smoking at a temperature high can cause protein denaturation in meat smoked like beef. Duration smoking longer can result in more denaturation broad, which can change protein structure and properties. During smoking, the resulting chemical from bio briquettes leaf processed cassava can react with protein in smoked beef sei. Duration different smoking can give framework time different For happening reaction chemistry this so resulted in change protein composition. Duration Longer curing is also possible to cause a level more drought high on smoked sei beef. contained water in meat can evaporate during smoking, so can affect the concentration of relative protein in the meat produced. Duration of different smoking can affect the ratio of carbohydrate to protein in meat smoked beef. Biobriquettes leaf processed cassava can produce compound carbohydrates that can interact with protein

during smoking, and the duration of different smokings can give time happening different reactions.

In the study of diluted liquid smoke from shell coconut, level more dilution low it turns out to have more influence significant to characteristic physical, chemical, and sensory meat cows, except water and protein content (Yusnaini *et al.*, 2012). With salting, smoking, and drying meat, the number of microbes generally decreased, however microorganisms halophilic increased (Dzudie *et al.*, 2003). Meat smoked beef has high protein content (36.66±0.61%) and low crude fat content (9.46±0.98%), with essential minerals like potassium concentration highest (444.76 ± 23.18 mg/100g), and Mn 0.18 ± 0.05 mg /100g (Ajai *et al.*, 2019). Different smoke compounds absorb water and fat differently (Martinez & Machado, 2016).

According to research by Lang *et al.*, (2018), Reese *et al.*, (2018), and Zhu *et al.*, (2015), sources of dietary protein animal versus a plant and nutrients related can have diverse effects on the gut microbiota, are known as the main mediator between food and host (Turnbaugh *et al.*, 2007) and can cause or prevent disease chronic and metabolic, eg cancer and disease cardiovascular. Ten trillion microorganisms, including bacteria, viruses, fungi, and protozoa, live in the stomach of humans. Among them, “gut microbiota,” or profile gut bacteria, is

very interesting Because relationship with interference in humans (Wang *et al.*, 2012; Jie *et al.*, 2017).

The amount of food protein that enters and is digested by bacteria in the large intestine is possibly different depending on a variety of circumstances. However, protein bioavailability can affected by protein changes during cooking as well as interaction with component food (Tuohy *et al.*, 2006). Other than that, no, unlike enzyme digestion, enzyme microbes make use of different cleavage sites, so produce production various peptides with various activity biology (Yamamoto, 1997). Glutamine has proven to become the most common amino acid found in meat beef, loin, and cut round, followed by taurine, alanine, glutamate, and alanine (Wu *et al.*, 2016). Fragment polypeptide made during postmortem protein degradation fragments This Then can hydrolyzed by enzymes peptidyl and aminopeptidase to produce more peptides small and individual amino acids. Meat-cooked beef still is a source of significant carnosine and anserine although the content of dipeptide is bioactive This is more low compared to fresh meat (Purchas *et al.*, 2004; Bachart *et al.*, 2006).

PH

Analysis results variance (ANOVA) (see Appendix 3c) shows that long curing treatment influential real (P<0.05) to see meat pH value.

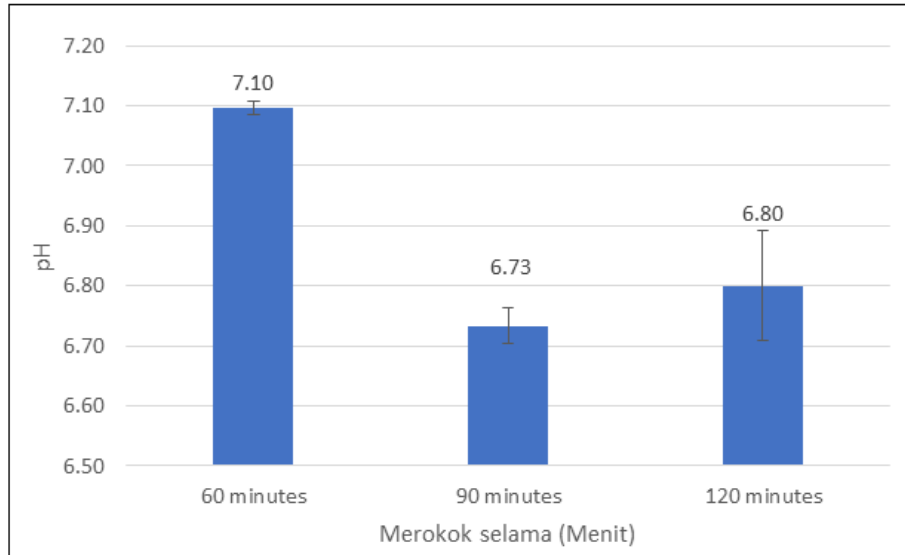


Figure 2: Changes in pH during the smoking process Se'i

In Figure 2 Duncan's post hoc test shows that a long smoking treatment of 60 minutes produces the highest pH value (7.10), different real with a long smoking treatment of 60 minutes and smoking long treatment of 90 minutes. The lowest pH value was obtained in the long smoking treatment of 90 minutes (6.73%), no different real with the long smoking treatment of 120 minutes.

Smoking with the use of bio briquettes leaf processed cassava can affect the pH value of sei meat due to the smoking process can change the environment chemistry inside meat. PH refers to the level of acidity or wetness of something substance, and in the context of meat, pH can affect characteristic organoleptic, age save, and security food. The decrease in pH is an indication of repaired quality meat, like enhanced capacity water binding, texture, and prevention droplets (Ahmad *et al.*,

2005). Smoking shows the color red cherries on the controlled meat, meanwhile color of cured meat the more increases with smoking. Maximum pH value present in the sample with combination treatment preservation, antioxidants, and smoking (pH value 6.72 compared to 5.89 in meat control). Smoking can cause an increase in the pH of the sample meat Because formation of polyanions and enhancement strength solution (Ahmad *et al.*, 2005).

Smoking process with the use of bio briquettes leaf burnt cassava involves burning material to produce smoke. This smoke contains compounds like sour acetic acid carboxylates, phenols, and compounds volatile. When the meat is exposed to smoke smoking, compounds can react with components of meat, including water and protein, affecting the environmental chemistry inside the meat. One possible impact happen is a decrease in meat pH. Compounds sour in smoke can acidify meat which causes a decrease in pH. This change in pH can affect the texture of meat, water-holding capacity, and taste.

However, the influence of pH changes can vary depending on a variety of factors, including duration of smoking, temperature, type of material fuel, and characteristics of meat That alone. If smoking is done for a long time or at very high temperatures, possibly a big meat pH value will experience more changes significant. Taste, aroma and characteristics of meat se'i given treatment Citrus aurantifolia extract will more better if given liquid smoke treatment from shell coconut, meanwhile, color and pH se'i are No affected with treatment (Angels *et al.*, 2015).

Need is known that pH changes in meat consequence of smoking with biobriquettes leaf kesambi are usually characteristic while and get influenced by factors, like method processing more continue. Important For doing proper testing and measurement to determine the effect of Specific smoking on the pH of sei meat.

The difference in the pH of smoked sei meat in the smoking time of 60 minutes, 90 minutes, and 120 minutes use of biobriquettes leaf torrefied kesambi can caused by several factors including protein breakdown, formation acid, fermentation process, and composition sei meat. Fueling the smoking process at temperature can result in protein breakdown in meat. Long smoking can cause more damage broad, so results in the release of amino acids and increased acidity (low pH) in meat. During smoking, reaction chemistry between compounds contained in bio briquettes leaf the beaten cassava with meat can cause the formation of compound sour. Duration long smoking gives a longer time for reactions, which can result decrease in meat pH. Duration of prolonged smoking also creates more conditions profitable for the fermentation process. Fermentation can produce compounds possibly acid lowering the pH of the meat. Composition chemistry bio

briquettes leaf Kesambi can also be processed to affect the pH of the meat. If material burns produce compound sour or significant language during the smoking process, p This can affect the pH of smoked sei meat.

CONCLUSION

Based on the results study can conclude that long curing treatment is influential to pH value and protein content, with treatment best is the long smoking time of 60 minutes which produces a pH value of 7.0967 and a protein content of 26.13%.

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