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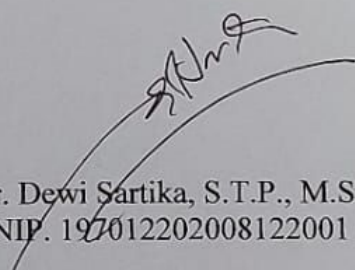
Penulis : 1. Dr. Dewi Sartika, S.T.P., M.Si.
2. Dr. Ir. Susi Astuti, M.Si.
3. Ria Iswandari

NIP : 1. 197012202008122001
2. 196708241993032002
3.

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Dr. Dewi Sartika, S.T.P., M.Si.
NIP. 197012202008122001

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Menyetujui:
Ketua Lembaga Peneliti dan
Pengabdian Kepada Masyarakat Unila


Dr. Ir. Lusmeilia Afrizni, D.E.A.
NIP. 196505101993032008

Mengetahui:
Wakil Dekan I FP Unila


Prof. Dr. Ir. Purnomo, M.S.
NIP. 196406131987031002

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Inhibitory Study Of Cassava Leather Ethanol Extract As Natural Antimicrobial In Reducing *Salmonella Sp.* And *Escherichia Coli* On Contamination Chicken Meat (*Gallus Domesticus*)

D Sartika¹⁾, S Astuti²⁾, R Iswandari³⁾

^{1,2)} Lecturer at the Department of Agricultural Product Technology, Faculty of Agriculture, University of Lampung

Jl. Prof. Soemantri Brojonegoro No. 1 Bandar Lampung, Lampung 35145

³⁾ Student of the Department of Agricultural Industry Technology, Faculty of Agriculture, University of Lampung

Email: dewikincai@gmail.com¹, sussi_astuti@yahoo.com², riaiswandari718@gmail.com³

Abstract: Chicken meat is a food product that is damaged easily and it's a good medium for microbial growth. Therefore, it is needed a way to reduce the contamination of microbial pathogens. Cassava leather is a byproduct that contains an active compounds and it has a natural antimicrobial function to reduce pathogenic microbe contaminant. This study to determine the presence of natural antimicrobial activity against *Escherichia coli* and *Salmonella sp.* in chicken meat. The research was conducted using single factor with 7 treatment in Completely Randomized Block Design as many as 5 replications. Seven treatments of this research one positive control treatment (amoxicillin), and one treatment as control (96% ethanol). The results is cassava ethanol extract able to inhibit of *Escherichia coli* with the inhibitory diameter of 10.08 mm and *Salmonella sp.* with an inhibitory diameter diameter of 9.17 mm at a concentration extract of 100%, by extract concentrations of 80%, 60%, 40%, and 20%, with each inhibitory diameter 8.98 mm, 8.67 mm, 8.62 mm, 8.45 mm against *Escherichia coli* and 8.58 mm, 8.22 mm, 7.73 mm, 7.56 mm against *Salmonella sp.*. The best concentration of cassava ethanol extract as a natural antimicrobial in chicken meat was 100% with total decrease to *Escherichia coli* 5.8×10^7 cfu / g (69.05%) and total decrease of *Salmonella sp* by 4.0×10^7 cfu / g (41.17%).

Keywords : Antimicrobial, Cassava leather, Chicken meat.

1. Introduction

Chicken meat is a source of animal protein which is widely consumed by people compared to beef. This is supported by BPS data (2016), an increase in chicken meat production in Indonesia from 2014 to 2016, respectively, 1,544,378 tons, 1,628,307 tons, and 1,689,584 tons. Meanwhile, the amount of beef production in 2014 - 2016 was 438.77 thousand tons, 523.93 thousand tons and 583.14 thousand tons. In addition to its high nutritional value, chicken meat is a perishable livestock product (rotten), so it becomes an excellent medium for microbial growth and acts as a carrier for several types of diseases that are harmful to humans or called *Foodborne diseases*. *Foodborne disease* occurs when a person consumes food or drinks contaminated by pathogenic microorganisms such as *Staphylococcus aureus*, *Escherichia coli*, *Coliform*, and *Salmonella sp* [19].

Men sequence studies Setiowati *et al.*[22], the percentage of chicken meat samples from traditional markets in Indonesia yang g positively contaminated with *Salmonella sp.* and *E. coli* is 10.06%. In Indonesia, especially in Malang, it is known that 3 out of 36 samples of fresh chicken carcass samples were detected positively contaminated by *Salmonella sp.* (Primajati, 2011). The results of research by Sartika *et al.* [19], showed the high contamination of *Salmonella sp.* which was identified in chicken meat in traditional markets and modern markets in Bandar Lampung with high levels of contamination, namely 3.30×10^8 cfu / g in traditional markets and 3.27×10^8 cfu / g in modern



markets. Referring to SNI-7388 [4] that the maximum limit of *Salmonella sp* contamination on chicken meat must be negative, the data above shows that chicken meat in traditional and modern markets does not meet quality standards. This bacterial infection in animals or humans can lead to a disease called salmonellosis (Serbeniuk, 2002). Salmonellosis epidemic in the world causes acute gastroenteritis or diarrhea (1.3 billion people) and death (13 million people) (Portillo, 2000). More than 50% of the causes of diarrhea outbreaks in the world are caused by food contaminated with *Salmonella sp*. (Milliotis and Bier, 2003).

Chicken infected with *Salmonella sp*. from the environment can spread these pathogenic bacteria contamination through feces. Then the feces will re-pollute the surrounding environment such as soil and water. Transmission of *Salmonella sp*. from the environment to animals, humans or food causing *food borne diseases* and *water borne diseases* (Bell and Kyriakides, 2002). Contamination of *Salmonella sp*. most often occurs in chicken, because hens infected with *Salmonella sp*. transovarially (through the ovaries) and can transmit these bacteria through livestock products. According to Soeparno [23], microbial contamination occurs through the surface of the meat during the meat preparation process, namely the process of cleavage of carcass (carcass cutting), cooling, freezing, refreshing frozen meat, manufacturing of processed meat products, preservation, packaging, storage, and marketing. Poor sanitation causes pathogenic microbial contamination to increase , one of which is *Salmonella sp*. [25].

According to Hariyadi [9], *Salmonella sp*. is an indicator of food safety . This is because all serotypes of *Salmonella sp*. which is known in the world is pathogenic, so the presence of these bacteria in food is considered a health hazard. *Salmonella sp*. causes a disease commonly referred to as salmonellosis . Salmonellosis is zoonotic meaning that it can be transmitted from animals to humans. *Salmonella sp*. transmitted to humans through foodstuffs originating from livestock infected by these bacteria [25].

The quality of chicken meat can be tested from a biological perspective to see the level of contamination of *E. coli bacteria* , because *E. coli bacteria* are used as an indicator of the sanitation of a processed product derived from meat or beverages [20]. Microbial contamination in foodstuffs is the result of direct or indirect contamination with microbial pollution sources, such as soil, air, water, dust, digestive tract and respiratory tract of humans and animals. Based on SNI No. 01-7388-2009 of 2009 concerning the maximum limit of microbial contamination in food, the number of *Escherichia coli bacteria* is 1×10^1 cfu / g.

The pathogenic microbial contamination test is an important indicator to determine the quality of processed chicken meat that is fit for consumption. The presence of pathogenic microbes in meat is very likely to occur, because the high nutrient content in chicken meat is a good medium for the growth and reproduction of microorganisms (Yulistiani, 2010). The simple and traditional processing of chicken meat is also very possible for pathogenic bacteria contaminants (Raza *et al* ., 2012). Therefore, efforts are needed to reduce microbial contamination to meet food safety levels in chicken meat.

Some efforts that can be made to control the damage and development of microbes are storing chicken meat at a cold temperature of 5 ° C, and preserving it with chemicals or natural ingredients that have antimicrobial properties [21]. Some merchants seek to preserve meat chicken by giving some chemical compounds such as borax as a preservative and may block the growth of both terrestrial pathogens. The provision of these chemicals is not justified by the Food and Drug Supervisory Agency (BPOM) because it can endanger the health of consumers.

Cassava peel is an agricultural residue that is found in abundance in various regions in Indonesia, including in Lampung. So far, this cassava peel has not been utilized optimally by the community, even though this cassava peel can be used as a raw material for making natural antimicrobials . The content of phenolic compounds, flavonoids, cyanides and tannins in cassava peels acts as a natural

antimicrobial [27]. Levels of HCN (cyanide acid) in cassava peels range <50-250 ppm, the safe limit for HCN levels justified by FAO for consumption is <50 ppm. Based on Atma (2013), the HCN level of Manalagi cassava is 19.5 ppm, which means it is safe for consumption. Therefore, research is needed to determine the effectiveness of cassava peels as an antimicrobial to reduce contamination in chicken meat contaminated with *Salmonella sp.* and *E. coli*. This study aims to determine the inhibitory power of cassava peel extract against *Salmonella sp.* and *Escherichia coli* on chicken meat and to determine the best concentration of cassava peel extract in reducing contamination of *Salmonella sp.* and *Escherichia coli* on chicken.

2. Materials And Methods

Materials and Tools

The main materials used in the study is the white part of peel cassava Manalagi obtained from the District of Batang Nuban, East Lampung District, meat chicken, cultures of *Salmonella sp.*, and *E. coli* cultures. While the auxiliary materials used are 70% alcohol, 96% ethanol, MacConkey Agar (MCA), aquadest, aluminum foil, cotton, filter paper, disc paper, Nutrient Agar (NA), Nutrient Broth (NB), XLD and BPW as well as other materials for microbiological analysis. The tools used in the study were scales, trays, ovens, vacuum rotary evaporators, petri dishes, test tubes, autoclaves, incubators, colony counters, drop pipettes, micrometers, Erlenmeyer, Beaker glass, measuring cups, tablets, and other analysis tools.

Research methods

The study was conducted to find the best concentration of cassava peel extract as an antimicrobial against *Salmonella sp.* and *Escherichia coli*. Each experiment used a single factor with 7 treatments in a Completely Randomized Design (RAKL) with 5 replications. Seven treatments with 5 levels of concentration of cassava peel extract, namely K_1 (10%), K_2 (8%), K_3 (60%), K_4 (40%), K_5 (20%), one control treatment. positive K_+ (amoxicillin), and one treatment as a control (96% ethanol). The data were analyzed for similarity of variance with the Bartlett test to determine the homogeneity of the data. After the data is homogeneous, then the data is analyzed with variance fingerprints to obtain a variety of error estimators and to determine whether there is an effect between treatments. To find out the difference between treatments, an advanced test was carried out using the Least Significant Difference (LSD) test at the 5% level [24]. As supporting data, a quantitative test of saponins, tannins and HCN was carried out.

3. Results and Discussion

Ethanol Extract of Cassava Bark

The results showed that from 500 g of dry cassava peel powder extracted with 96% ethanol solvent by maceration method, the yield was 10% concentrated extract, had dark brown characteristics and had a distinctive aroma of cassava peels. Maceration is a process of extraction of the implisia using a solvent with several times shaking or stirring at room temperature (Ditjen POM, 2000). The advantage of extraction by maceration is that the workmanship and equipment used is simple, while the disadvantages are that it takes a long time to process, requires a lot of solvent and less perfect extraction (Tiwari *et al.*, 2011).

The dried implisia are powdered with the aim of increasing the surface area of the raw material. The wider the surface area, the faster the raw material will dry and the greater the contact with the solvent so that the desired active compound is more easily extracted. The choice of ethanol solvent is because ethanol is a universal solvent that can attract compounds that are soluble in non-polar

solvents . Secondary metabolite compounds that act as antimicrobials have non-polar properties so that they can be dissolved in non-polar solvents (Gunawan *et al.*, 2008).

Active Compounds Ethanol Extract of Cassava Bark

The results showed that the ethanol extract of cassava peel had secondary metabolite compounds which functioned as antimicrobials. This is evidenced by quantitative tests on tannins, saponins, and HCN compounds. The levels of active compounds in the ethanol extract of cassava peels can be seen in Table 1.

Table 1. Content of the active compound of cassava peel ethanol extract

Active Compounds	Amount (mg / L)
Tannins	583.26
Saponins	8280.00
HCN	10.60

Tannins

Cassava bark ethanol extract had higher levels of tannins of 583.26 mg / L . Tannins have antibacterial activity because they can bind to bacterial cell walls, inhibit growth and protease activity (Monalisa, 2011). Tannin levels obtained from the results of the study can provide antimicrobial effects against *E. coli* and *Salmonella sp* . . According to Buck (2001), tannins can directly enter and penetrate into cells by means of passive diffusion, then interact with proteins in the peptidoglycan layer, causing damage to the cell wall. This will then cause the bacteria to undergo lysis due to high osmotic pressure from within the cell. Kusuma's research [14] states that the ethanol extract of banana peels can inhibit the growth of *Escherichia coli* because it is suspected that there are levels of active compounds including tannins that give an antimicrobial effect. However, according to Permadi (2010), it is stated that the b above is safe for the tannin content in food ingredients according to the ADI value, which is 560 mg / L body weight / day , the results showed that the tannin content from the ethanol extract of cassava peels was 583 mg / L slightly above. safety limit. The effect caused by tannins is to cause a bitter taste in food ingredients . This compound is carcinogenic when consumed in excessive amounts and continuously, so it must be reduced before consumption by cooking. Tannins are volatile compounds that easily evaporate during cooking, so that their levels decrease (Chrissanty, 2011).

Saponins

Cassava bark ethanol extract had higher levels of saponins of 8280 mg / L . The levels can provide antimicrobial efficacy against *E. coli* and *Salmonella sp* .. M ccording Ami (1994), saponins have molecules that can draw water or hydrophilic and can dissolve fat molecules or lipophilic so as to reduce the surface tension of the cells that ultimately lead to the destruction of bacteria (Istiana, 2005). The main effect of saponins on bacteria is the release of proteins and enzymes from the cells. Saponins are antimicrobial by damaging cell membranes. The damage to the membrane causes important substances to leave the cell and can also prevent the entry of important materials into the cell. If the function of the cell membrane is damaged, it will result in cell death (Monalisa *et al* ., 2011). Through this mechanism, it is suspected that saponins in cassava peel extract have antimicrobial properties that can inhibit the growth of *E.coli* and *salmonella sp* . . Saponins are characterized by their bitter taste and their ability to dissolve red blood cells. Saponins dissolve in water to form foam like soap scum, this is because saponins have amphiphilic properties. The glycoside bonds in saponins are quite stable, but can be broken down chemically by strong acids in water (Sudarma 2014).

HCN

The ethanol extract of cassava peels has an HCN level of 10.60 mg / L. The results of Atman's [3] study showed that Manalagi cassava had HCN levels of 19.5 ppm. According to Lenny (2006), a sam cyanide (HCN) are toxic so that cyanide entry into the cell structure of *Staphylococcus aureus* and poisoning that disrupts metabolic processes in cells and even cell death. Levels of HCN (cyanide acid) in cassava peels range <50-250 ppm. The safe limit for HCN levels for consumption according to the FAO is <50 ppm. Based on the results of the study, the HCN level of Manalagi cassava peel was 10.60 ppm, which means it is safe for consumption.

Antimicrobial Activity of Cassava Bark Ethanol Extract

Based on the research results, the ethanol extract of the cassava peel showed the formation of a clear zone around the disc paper on both *E.coli* and *Salmonella sp.* . The results of measuring the diameter of the inhibitory power of bacteria can be seen in Table 2.

Table 2. Diameter of inhibition of ethanol extract of cassava peel, amoxicillin, and ethanol 96% against *E s cherichia coli* and *Salmonella sp.*

Test bacteria	Treatment (%)	Inhibition diameter ± sd (mm)
<i>Escherichia coli</i>	K ₁	10.08 ± 0.58 a
	K ₂	8.98 ± 0.28 b
	K ₃	8.67 ± 0.28 bc
	K ₄	8.62 ± 0.32 cd
	K ₅	8.45 ± 0.23 de
	K	1.69 ± 0.84 f
	K ₊	12.84 ± 0.30 g
<i>Salmonella sp.</i>	K ₁	9.17 ± 0.42 a
	K ₂	8.58 ± 0.30 b
	K ₃	8.22 ± 0.33 bc
	K ₄	7.73 ± 0.29 cd
	K ₅	7.56 ± 0.43 d e
	K	1.45 ± 0.88 f
	K ₊	15.60 ± 0.22g

Note: Numbers followed by the same letter indicate that they are not different real at the level of α 5%

K₅ = 20% concentration of cassava peel ethanol extract

K₄ = 40% concentration of cassava peel ethanol extract

K₃ = 60% concentration of cassava peel ethanol extract

K₂ = 80% concentration of cassava peel ethanol extract

K_1 = concentration of 100% cassava peel ethanol extract

K = Control (96% ethanol)

K_+ = Positive control (amoxicillin)

The concentration of 100% ethanol extract of cassava peels had the largest diameter of inhibition against the growth of *E. coli* and *Salmonella sp*. (Table 4). According to Pradana (2013) in Saraswati (2015), based on the diameter of the inhibitory power formed, antibacterial activity is classified into four groups, namely weak (diameter of inhibition power <5 mm), medium (diameter of inhibition power between 5-10 mm), strong (diameter resistance between 10-20 mm), and very strong (diameter of resistance > 20 mm). The ethanol extract of cassava peels has different inhibitory effects on *Escherichia coli* and *Salmonella sp*. so that a further test was carried out to see the significant differences resulting from each of the extract concentrations against the two tested bacteria.

The results of the LSD further test at the 5% level indicated that the extract concentration Cassava peel ethanol concentration was 100% significantly different from other treatments in the *Escherichia coli* bacteria. The concentrations of 80%, 60% and 40% were not significantly different in the tested bacteria, but were significantly different from the concentrations of 100% and 20%. Positive control (amoxicillin) showed the largest diameter of inhibition compared to the other five extract concentrations.

The diameter of inhibition formed at a concentration of 100% was classified as moderate antimicrobial with a diameter of 10.08 mm of inhibition against *E. coli*. The 80% concentration of the ethanol extract of cassava peels has an inhibitory capacity of 8.98 mm in diameter. At a concentration of 60% inhibition diameter is formed at 8.67 mm. P there is a concentration of 40%, a diameter of 8.62 mm is formed. S edangkan extract concentration ethanol cassava peel the lowest was 20% at 8:45 mm. has the smallest diameter of inhibition compared to other extract concentrations

The results of the LSD further test at the 5% level on the diameter of inhibition of *Salmonella sp*. showed that the ethanol extract concentration of cassava peels was 100% significantly different from other treatments. The concentrations of 80%, 60% and 40% were not significantly different in the tested bacteria, but were significantly different from the concentrations of 100% and 20%. The diameter of the inhibitory power formed in *Salmonella sp* test bacteria was classified as moderate (9.17 mm) at a concentration of 100%. A concentration of 80% of the ethanol extract of cassava peels had a diameter of inhibition of 8.58 mm. The diameter of inhibition was formed 8.22 mm at a concentration of 60%. P there is a concentration of 40% to form a diameter of inhibition of 7.73 mm. S edangkan extract concentration ethanol cassava peel the lowest was 20% at 7:46 mm has a diameter of inhibitory most smaller than the concentration of other extracts. Concentrations of 80%, 60%, 40% and 20% of the ethanol extract of cassava peels are classified as antimicrobials with moderate activity. Amoxicillin as a positive control has stronger antimicrobial activity than the ethanol extract of cassava peels, however, the continuous use of commercial antibiotics such as amoxicillin causes bacteria to become resistant. Control (96% ethanol) showed the smallest inhibition results, namely <2 mm against *Escherichia coli* and *Salmonella sp*.

These results are in accordance with the research conducted by Kusuma [14] that 96% ethanol does not provide an antimicrobial effect on *Escherichia coli*. The results of this study are in line with the results of Hartari's [10] research, which states that rubber cassava peel extract has antimicrobial activity that can inhibit the growth of *Vibrio*, *staphylococcus aureus*, *E. coli* and *Salmonella sp*. Gram negative bacteria such as *Salmonella sp* are generally more resistant to antimicrobial compounds than Gram positive bacteria [6]. This is related to the multilayered structure of the Gram negative bacterial cell wall, composed of several layers, namely lipopolysaccharide, peptidoglycan, and lipoprotein [6]. *E. coli* is a Gram negative bacteria which is more sensitive to the activity of antimicrobial compounds. The cell wall structure of Gram positive bacteria consists of thick peptidoglycan which provides rigidity to maintain cell integrity. When there is damage to the cell wall or there are obstacles

in its formation, lysis of bacterial cells can occur so that the bacteria immediately lose their ability to form colonies and are followed by bacterial cell death (Morin and Goman, 1995). The effect of the ethanol extract of cassava peels is thought to inhibit cell wall assembly and interfere with the incorporation of the glycan chain so that it is not connected or completely bound to the cell wall peptidoglycan, causing a weak structure and causing bacterial death.

The results of measurements of the clear zone area of the ethanol extract of cassava peels against *Salmonella sp* and *E. coli are* presented in Figure 1.

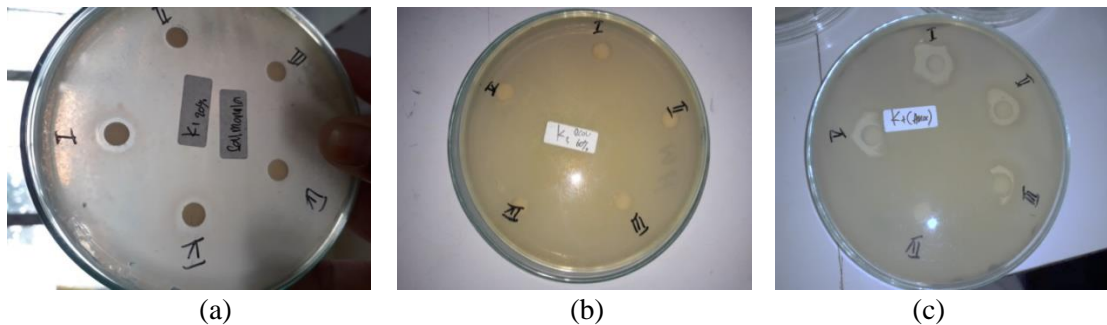


Figure 1. Area of inhibition of cassava peel ethanol extract against *Salmonella sp* . (a), the area of inhibition of the ethanol extract of cassava peels against *E. coli* (b), the area of inhibition of the activity of amoxicillin and ethanol 96% (c)

The best concentration on the inhibition of growth of bacteria *E.coli* and *Salmonella sp* . is the ethanol extract of cassava peels with a concentration of 100%. The 100% concentration of cassava peel ethanol extract had levels of tannins of 583.26 mg / L and saponins of 8280 mg / L with inhibition diameter of 10.08 mm and 9.17 mm, respectively. Ami's research results (2016) show that cherry bark has saponin levels of 823 0 ppm and tannins of 1783 ppm have antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* with a diameter of inhibition of 11 mm.

Tannins have antibacterial activity by precipitating protein, activating enzymes and destroying the function of genetic material [22]. Disrupted cell permeability causes cells to be unable to carry out activities so that their growth is inhibited or even dies (Ami, 2016). Secondary metabolites such as tannins, saponins and HCN are able to damage microbial cells by preventing permeability of the cytoplasmic membrane, causing leakage of intracellular materials, then denaturing protein proteins and activating enzymes. In addition, antimicrobial compounds can also break peptidoglycan cross-links by penetrating the cell walls, causing leakage of cell nutrients due to damage to hydrophobic bonds. Damage to the membrane results in inhibition of activity and biosynthesis of specific enzymes required in the process of cell metabolism [6].

According to Prescott (2005) , the difference in the diameter of the inhibitory power formed is due to the sensitivity level of the test organism, the difference in diffusion rate of antibacterial compounds and the concentration of antibacterial compounds. This causes a large difference in the diameter of the inhibitory power formed against the two bacteria. The bacteria *Escherichia coli* more sensitive to the compound antibacterial contained in the peel extract of cassava compared to the bacteria *Salmonella sp* . However Thus , the ethanol extract of cassava peel effect which does not differ much in inhibiting the growth of *Escherichia coli* and *Salmonella sp* .

Positive control (amoxicillin) showed the largest diameter of inhibition compared to the other five extract concentrations. This is because amoxicillin is a commercial antibiotic that contains high antimicrobial compounds. Amoxicillin is a type of antibiotic that has a broad spectrum, stable acid, semi-synthesis, including the Penicillin class (β -lactam antibiotic) which is effectively used to treat Gram-positive and Gram-negative bacterial infections in humans and animals by inhibiting bacterial

cell wall synthesis [12]. The 100% extract concentration has the largest area of inhibition compared to other concentrations due to the nature of the extract that is still pure, so that the high levels of active compounds are able to provide optimal antimicrobial effectiveness without dilution with the addition of distilled water. According to Reveny (2011), the average diameter of the inhibitory power formed from antibacterial compounds increases with increasing extract concentration. This is because one of the factors that influence the work of antimicrobial compounds is the concentration of the substance. The higher the concentration of the substance the greater the inhibitory effect because the more active substances are contained therein.

Total Bacteria Decrease Test in Chicken Meat

The results showed that the addition of cassava peel ethanol extract reduced *E.coli* and *Salmonella sp.* Contamination in chicken meat. This is evidenced by a decrease in the number of *E. coli* and *Salmonella sp.* In chicken meat after adding 100% ethanol extract of cassava peel that has been diluted with 0.85% NaCl physiological solution, so that the concentration of the ethanol extract of cassava peels becomes 10%. The results of the average calculation of *E. coli* and *Salmonella sp.* obtained from total colony measurements five times. The results of total reduction test for *E. coli* and *Salmonella sp.* On chicken meat using ethanol extract of sin gkong skin can be seen in Table 3

Table 3 . The test results of total reduction of *E. coli* and *Salmonella sp.* On chicken meat used the best concentration of ethanol extract of cassava peel (100%)

Bacteria	Average (colony / g)		Total drop (colonies/g)	Total decline (%)
	Before adding the extract	After adding the extract		
<i>Escherichia coli</i>	8.4×10^7	2.6×10^7	5.8×10^7	69.05
<i>Salmonella sp.</i>	1.0×10^8	6.2×10^7	4.0×10^7	41.17

The results of total reduction test for *E. coli* and *Salmonella sp.* in chicken meat using the best extract (100% concentration) shows that the total average of *E. coli* before the addition of the ethanol extract of cassava peels is 8.4×10^7 cfu / g, after adding the total extract of *E. coli* becomes 2.6×10^7 cfu / g . Total *Salmonella sp* test on chicken meat was 1.0×10^8 cfu / g, and 6.2×10^7 cfu / g after giving the ethanol extract of cassava peel. The ethanol extract of cassava peel can reduce *E.coli* contamination by 69.05% and 41.17% in *Salmonella sp.* The reduction in pathogenic microbial contamination in chicken meat is due to the presence of antimicrobial compounds in the ethanol extract of cassava peels which hinders the peptidoglycan synthesis process so that the bacterial cell wall bonds become weak, causing lysis. As a result of lysis of bacterial cells, the cell wall does not function to maintain shape and protect bacteria that have a higher osmotic pressure. *Escherichia coli* and *Salmonella sp* are Gram negative bacteria which are more sensitive to antimicrobial compounds so they are more prone to lysis (Jawetz *et al.* , 2001).

Secondary metabolite compounds found in the ethanol extract of cassava peels include tannins, saponins, and HCN which function as antimicrobials so they can have a reduction effect on *E.coli* and *Salmonella sp* contamination in chicken meat. This is because secondary metabolites are able to block cell wall biosynthesis by inhibiting the work of enzymes in synthesizing different components of the cell wall. Secondary metabolite compounds can affect the integrity of the bacterial membrane. Antimicrobials affect protein synthesis, act as destroyers of ribosomal units, bind to 50S units and prevent translation and bind to 30S units causing translation errors, producing toxins and affecting proteins. Antimicrobial compounds will affect the function of DNA replication and repair, inhibiting the enzymes gyrase, topoisomerase and N-methyltransferase. In the end, antimicrobial compounds

interfere with intermediate metabolism by inhibiting enzymes in the biosynthesis of different substances so that bacterial growth is low (Berdy, 2005).

4. Conclusion

1. The ethanol extract of cassava peels has antimicrobial activity against *Escherichia coli* and *Salmonella sp* in chicken meat . The ethanol extract of cassava peel is able to inhibit the growth of *Escherichia coli* with an inhibitory power diameter of 10.08 mm (moderate antibacterial activity) and has an antimicrobial ability against *Salmonella sp* . with an inhibitory power diameter of 9.17 mm (moderate antibacterial activity) at a concentration of 100% cassava peel ethanol extract. The extract concentrations were 80%, 60%, 40%, and 20%, respectively 8.98 mm in diameter, 8.67 mm, 8.62 mm, 8.45 mm against *Escherichia coli* and 8.58 mm, 8.22 mm, 7.73 mm, 7.56 mm respectively. *Salmonella sp* .
2. The best concentration of ethanol extract of cassava peel as a natural antimicrobial in chicken meat is 100% with a total reduction of *Escherichia coli* of 5.8×10^7 cfu / g (69.05%) and a total reduction of *Salmonella sp* of 4.0×10^7 cfu / g (41.17%)) with dilution using a physiological solution of 0.85% NaCl so that the extract concentration becomes 10% . .

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