Bekicot (Achatinafulica) is a gastropod class animal consumed by TNS community. It is processed in several ways including fried, boiled, and roasted. This study aims at determining the amount of bacteria found in snails that are processed in accordance with the habits of the community and stored for 3 hours, 6 hours, and 9 hours. This type of research is a descriptive study to see the quality of microbiology. This research was conducted in TNS sub-district for sampling and a microbiology test was carried out in the Basic Laboratory of Biology Education at Pattimura University. The results showed that among the three treatments, the lowest number of colonies was 3 hours treatment. The lowest amount of bacteria was found in bekicot meat by roasting with an average of 11.3 Cfu / g. In the storage period of 6 and 9 hours the meat is not safe to be consumed because it contains more than 5x105 Cfu / g bacteria, the highest number of bacteria or cannot be counted (CNbC) is found in meat by boiling.

Introduction:
As the basic necessity for human being, it is advised to consume fresh food either from plants or animals (1, 12, 19). Bekicot (Achantinafulica), a gastropod class snail is one of the food sources contain high nutritious protein.(3, 6). This species lives in agricultural areas, coastal areas, wetlands, natural forests, shrubs, and urban areas. Besides, it can also live in forests, and plantations or cultivation sites (4, 16). This land snail is abundant in times of high rainfall in tropical regions. A. fulica is the main plant pest species which originated from East Africa but it has spread all over the world since before the 1800s (2).

Bekicot has high protein. The protein content of this snail is 59.28%, fat 3.62%, crude fiber 2.47%, calcium 6.4% and phosphorus 0.85% (9). However, this snail is poisonous and can cause death if not treated properly.

This snail has been consumed by people in Central Maluku District, especially in TNS Sub-district. The meat of the snail can be processed in various ways such as frying, roasting and boiling without adding preservatives. In other areas, it is made into crackers or satay. By frying, roasting and boiling, microorganisms can contaminate the meat, it...
is becausethe processed meat is not consumed all at once but there is leftover to be consumed later. The leftover contains water that might cause microorganisms to activate enzymes that play a role in the process of biodegradation of proteins that can cause decay(14). Therefore, storage of processed meat of the snail should not exceed 4 hours after being cooked until consumed (13). It is necessary to conduct research to determine the presence of microbes in three types of processing and different storage times.

Besides being a source of nutrition for humans, food is also the source of food for microorganisms. The growth of microorganisms in food can be beneficial or detrimental. For example, it can benefit to the improvement of nutrition, digestibility or storage. However, it can also cause undesirable physical or chemical changes, so the food is not suitable for consumption (11, 12).

**Materials and Method:**
This research applies descriptive study approach using a completely randomized design (CRD) that is to see the number of bacteria in bekicot meat that are processed by boiling, smoking, and fried and carried out with different storage times, namely 3 hours, 6 hours and 9 hours.

**Research Procedure:**
**Sterilization of Tools and Materials:**
Sterilization was done using hot steam sourced from the autoclave at a temperature of 120°C at a pressure of 15 psi. This is to avoid contaminants by bacteria that are not from the sample used.

**Creating the Medium:**
Preparation of peptone (liquid) medium for dilution by weighing 15 grams of peptone and put in 1000 ml of distilled water into an erlemeyer flask and then heated on a hotplate until it becomes homogeneous. The medium is ready to be sterilized in an autoclave for 15 minutes. Medium Nutrient (solid) for bacterial growth by weighing 14 grams of NA and 500 ml of distilled water, into an erlemeyer flask, then heat it on a hotplate until the solution becomes homogeneous. The medium is ready to be sterilized in an autoclave for 15 minutes.

**Sampling Stages:**
Snail sampling was taken from TNS District. Snails selected have the same size as the sample pliers taken directly put into a bucket and covered with plastic. Snail samples then are ready to be taken to the Biology Lab for treatment.

**Sample Preparation:**
Snail meat is separated from the shell. After being separated, washed and soaked with 15% salt water for 60 minutes so that the mucus contained in the snail is easily removed.

**Processing Process:**
The processing of bekicot meat is done in 3 different times. This is because a preliminary test of the processing time has been done for the three treatments. For boiling it takes 25 minutes, while roasting and frying 5 minutes. However, the focus of this study is to see length of storage for 3 hours, 6 hours and 9 hours.

**Dilution Stage:**
Snail meat samples treated using three treatments were taken as much as 10 grams from the three treatments to conduct the dilution stage. The dilution step is carried out at a dilution rate of 10-1, 10-2, 10-3 and the sample used for inoculation is at a 10-3 dilution level which will be implanted in the Natrium Agar (NA) medium taken as much as 0.1 ml.

**Planting:**
The method used is the agar surface method (spread plate). The media is poured into a petri dish and allowed to freeze. After freezing perfectly, samples were taken using a 0.1 ml pipette from a 10-3 dilution and spread into petri dishes which already contained NA media. After that each petri dish is given a name, level of dilution and test date, the petri dish is then put into an incubator and incubated for 24 hours at 370C.
Observations:
After incubation, the petri dishes are removed and arranged according to the dilution level. Numbers of colony in each petri dish is counted using colony counter.

Techniques of Data Analysis:
The data obtained in this study are descriptive to see the number of microbes contained in a Petri dish.

Data Collection Procedure:
Data collection was carried out after an incubation period of 1 x 24 hours. Bacterial colonies are counted in each petri dish. Calculation of the number of bacterial was done using a colony calculation tool. The number of bacterial colonies was counted in each cup, then the number of bacterial colonies were counted per gram sample as specified. Number of colonies = number of colonies per cup

\[
\frac{1}{\text{dilution}} \times 10
\]

For microbial analysis a standard called "standard plate count (SPC)" is used.

Results And Discussion:

Results:
Testing the presence of bacteria in bekicot inoculated by using the Surface pour Plate (7) method, while calculating bacterial colonies by using a Colony Counter, each cup viewed the total bacterial colonies per gram of bekicot samples (1). Microbiological quality testing aims to determine the total number of bacterial colonies in each fumigation material. Observation data on the processing with length of storage towards the presence of bacteria in bekicot meat are presented in table 1, 2 and 3 below:

Table 1: Bekicot processing method for 3 hours storage.

| No | Processing method | Dilution | ΣColony of Bacteria (Cfu/g) | Total plate count (Cfu/g) | Average |
|----|-------------------|----------|---------------------------|--------------------------|---------|
| 1  | Fried             | $10^{-3}$ | 8                         | $8.0 \times 10^4$        | 13.6 Cfu/g |
|    |                   | $10^{-3}$ | 22                        | $2.2 \times 10^4$        |         |
|    |                   | $10^{-3}$ | 11                        | $1.1 \times 10^5$        |         |
| 2  | Roasted           | $10^{-3}$ | 20                        | $2.0 \times 10^5$        | 11.3 Cfu/g |
|    |                   | $10^{-3}$ | 6                         | $6.0 \times 10^4$        |         |
|    |                   | $10^{-3}$ | 8                         | $8.0 \times 10^4$        |         |
| 3  | Boiled            | $10^{-3}$ | 23                        | $2.3 \times 10^5$        | 15.6 Cfu/g |
|    |                   | $10^{-3}$ | 14                        | $1.4 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 10                        | $1.0 \times 10^5$        |         |

Table 2: Bekicot processing method for 6 hours storage.

| No | Processing method | Dilution | ΣColony of Bacteria (Cfu/g) | Total plate count (Cfu/g) | Average |
|----|-------------------|----------|---------------------------|--------------------------|---------|
| 1  | Fried             | $10^{-3}$ | 53                        | $5.3 \times 10^5$        | 51 Cfu/g |
|    |                   | $10^{-3}$ | 74                        | $7.4 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 25                        | $2.5 \times 10^5$        |         |
| 2  | Roasted           | $10^{-3}$ | 44                        | $4.4 \times 10^5$        | 59 Cfu/g |
|    |                   | $10^{-3}$ | 54                        | $5.7 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 79                        | $7.9 \times 10^5$        |         |
| 3  | Boiled            | $10^{-3}$ | 56                        | $5.6 \times 10^5$        | 420 Cfu/g |
|    |                   | $10^{-3}$ | 64                        | $6.4 \times 10^5$        | CNbC    |

Remarks: CNbC = Can not be counted

Table 2: Bekicot processing method for 9 hours storage.

| No | Processing method | Dilution | ΣColony of Bacteria (Cfu/g) | Total plate count (Cfu/g) | Average |
|----|-------------------|----------|---------------------------|--------------------------|---------|
| 1  | Fried             | $10^{-3}$ | 53                        | $5.3 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 74                        | $7.4 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 25                        | $2.5 \times 10^5$        |         |
| 2  | Roasted           | $10^{-3}$ | 44                        | $4.4 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 54                        | $5.7 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 79                        | $7.9 \times 10^5$        |         |
| 3  | Boiled            | $10^{-3}$ | 56                        | $5.6 \times 10^5$        |         |
|    |                   | $10^{-3}$ | 64                        | $6.4 \times 10^5$        | CNbC    |

Remarks: CNbC = Can not be counted
Bactery (Cfu/g) | \(10^3\) | \(10^3\) | \(10^3\) | (Cfu/g) | TBUD | TBUD | TBUD | TBUD | TBUD | TBUD | CNbC
---|---|---|---|---|---|---|---|---|---|---|---
1 | Fried | \(10^3\) | 24 | TBUD | 2.4 \(\times\) \(10^3\) | 124 Cfu/g
2 | Roasted | \(10^3\) | 40 | TBUD | 40 \(\times\) \(10^5\) | 116 Cfu/g
3 | Bioled | \(10^3\) | TBUD | TBUD | TBUD | CNbC

Remarks : CNbC = Can not be counted

The results of observation in table 3 shows that the number of colonies that grow exceeds the maximum limit of 5\(\times\)105 Cfu / g and is not suitable for consumption and the highest number of CNbC bacteria was found in bekicot’s meat by boiling method, followed by roasted method with an average of 116 Cfu / g, and fried method with an average of 124 Cfu / g.

**Discussion:**

Bekicot meat processing was done with 3 different treatments and inoculated on NA medium used Spread plate method at \(10^{-3}\) dilution. The \(10^{-3}\) dilution process was aimed at reducing or minimizing the number of microbes suspended in the liquid (19). From the results of the study, it was obvious that physical form (organoleptically) in bekicot meat from the three processing methods is still excellent, but based on microbiological test results not all snail meat can be consumed.

3 hours storage time is the best storage time used to store bekicot meat because it produces the least amount of total bacterial colonies compared to 6 hours and 9 hours of storage. So that the storage time of 3 hours for bekicot meat is highly recommended for consumption either by frying, roasting or boiling because the growth of bacteria in petri dishes has not exceeded the maximum limit set by the SNI which is 5\(\times\)105 per cup (table 1), whereas in fried, roasted, and boiled bekicot meat for 6 and 9 hours of storage and incubated for 24 hours found that the bacteria grew beyond the maximum limit, making it unsafe to be consumed (table 2 and 3).

The presence of bacteria in bekicot meat with 6-9 hours of storage is due to high water content in the meat. The damage to the meat is caused by microorganisms, enzyme activity, temperature, and water content which is affected by the duration of storage, that will cause greater damage. This is because the bases broken down by bacteria get more and more over time (10, 12, 16)

Besides fish, bekicot is an important source of nutrition for humans because they are rich in protein. The advantage of bekicotas food is because it is easy to get in the environment and accessible by the community and it is easy to digest as well. However the food products consumed by humans are strongly influenced by microorganisms (15). In addition, microbes can contaminate food through water, dust, air, soil, processing equipment (during the production or preparation process) as well as secretions from the intestines of humans or animals (17).

Pathogenic bacteria can grow and multiply during storage, so that they are able to produce toxins that can be harmful to humans (6), so that storage should not exceed 4 hours (13).

One of the factors that influence the growth of microorganisms that destroy fresh food stored is temperature and water (8, 9, 14). Materials that are dissolved in water, can be used by microorganisms to form cell material and obtain energy (12).

Food damage by microorganisms is a form of damage that is often harmful and sometimes harmful to human health, because the toxins produced can be consumed by humans (7, 12). Enterobacteriaceae is often found in smoked fish that are high in water content, this will also occur in bekicot because the water content in these three treatments is also quite high. Because processing methods combined with heating and contamination from processors are unavoidable, bekicot processed products are also susceptible to the growth of Staphylococcus aureus, Aspergillus spp and Penicillium spp (11).
In addition to diseases caused by bacteria, another danger is the occurrence of poisoning due to the growth of Clostridium botulinum, a spore-forming bacteria that is very heat-resistant, which produces botulism poison (10).

Based on the results of this study, it is recommended that bekicot’s meat that is fried, roasted and boiled should be consumed immediately after processing because it has not been much contaminated by bacteria. If it is to be stored, it is better if the storage time is no more than 4 hours, so that it is still safe to be consumed or it is recommended to store the meat at low temperatures such as refrigerators because low temperatures can slow food spoilage or enzymatic processes caused by microorganisms.

Conclusion:-
Based on the results of the study it can be concluded that the method of processing by frying, roasting and boiling affects the presence of bacteria, therefore a good storage time is 3 hours because the number of bacterial colonies does not exceed the maximum limit of microbial contamination issued by the Director General of Drug and Food Control is 5,104 cpu / gram

Suggestions:-
This research needs to be continued to see species of contaminant bacteria found in snails. For TNS people, it is better to consume bekicot meat that is not more than 3 hours storage time.

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