



RAT BAIT PREFERENCE IN VECTOR CONTROL EFFORTS IN CITRA BARAKA MARKET, DISTRICT, ENREKANG

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INTRODUCTION

Rats have a major impact on humans and the environment as reservoirs of several pathogens that cause disease in humans. The urine and saliva of rats can cause leptospirosis."[1] The bite of rats can cause bubonic plague. In addition, rats can also transmit several other diseases including Murnie typhus, Salmonellosis, Richettesial pox, Rabies, and Trichinosis. The types of diseases transmitted by rats or other animals to humans and should be, are generally known as zoonotic diseases. These diseases can be fatal if not treated properly and lead to death[2].

The presence of rats in a human environment can reflect the sanitation of the environment. Rats like dirty, damp, and poorly lit places[3] Impact on the environment Damage to infrastructure Rats can also cause damage to building structures, electrical wiring, water pipes, and other items by chewing or damaging them to make nests or find food. Economic loss in agriculture, rats can damage crops and agricultural products. This can cause economic losses to farmers and the agricultural industry."[4].

In the health field, it is known that rodents can spread a wide range of diseases caused by various disease agents or psychologically such as rodentophobia (fear of rats). [These diseases are naturally maintained in nature in wild small mammals and incidentally transmitted to humans, livestock and pets. In the rat body, there are several other animals (parasites) that are inside the body (endoparasites) and outside / attached to the body (ectoparasites) which are the cause of many types of diseases. Rat endoparasites include worms, viruses, fungi, protozoa, bacteria and rickettsia that live in the liver and kidneys of rats. While rat ectoparasites include lice, fleas, mites, and ticks [6] The types of diseases carried by rats include bubonic plague, leptospirosis, murine typhus, scrub typhus, schistosomiasis, leishmaniasis, salmonellosis, and chaga disease [7].

The interaction of rats and humans directly and indirectly jeopardizes human welfare, as rats have become vector lifeforms capable of transmitting various diseases through ectoparasites and endoparasites. Disease transmission from rats is called rat borne disease." [8] Rodents have ectoparasites and endoparasites such as insects, bugs, worms, parasites, infections, protozoa and microorganisms that can cause a wide range of human diseases including leptospirosis and bubonic plague [9].

Citra Baraka Market has a high level of rat infestation. This significant presence of rats makes it an appropriate location for rodent control research. Rodent control depends on high levels of invasion, general welfare effects, expected financial misfortune, market notoriety, consistency with hygiene guidelines, product variety, local area support, and market scale and availability. These many variables make Citra Baraka Market an ideal place for a complete and feasible rodent control study. In Citra Baraka Market, rat control is necessary because the Market is a gathering place for many people and goods, which can create an ideal environment for disease vectors such as mosquitoes, flies and rats to breed and spread disease. In 2021, there were 734 cases of Leptospirosis in Indonesia reported by eight provinces, namely DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, North Kalimantan, and East Kalimantan. Of these reported cases, 84 died with a Case Fatality Rate (CFR) of 11.4%. Leptospirosis cases decreased compared to 2020, from 1,170 to 734 cases in 2021. Meanwhile, CFR increased

from 9.1% to 11.4%. East Java, Banten, North Kalimantan, and East Kalimantan provinces reported an increase in cases. Meanwhile, a significant decrease in cases occurred in the provinces of DKI Jakarta, West Java, Central Java, and DI Yogyakarta. Despite showing a decrease in cases, Central Java Province reported high cases in 2021. East Java and Central Java provinces are the largest contributors to all cases in Indonesia, namely 42.5% and 36.1% respectively [10].

South Sulawesi Province was one of the provinces that reported four cases with one death in Pangkep District, South Sulawesi Province during the period January - March 2023. Makassar City, Menggala Sub-district is one of the target areas of the survey even though until now there have been no reported cases/suspected reports of Leptospirosis. However, increased vigilance against the risk of Leptospirosis must be implemented considering that Menggala Sub-district has an area that is always flooded during the rainy season. The Vector and Disease Carrying Animals Working Team from the Directorate General of P2P of the Ministry of Health of the Republic of Indonesia together with BTKLPP Class 1 Jakarta, KKP Class I Makassar, KKP Class I Denpasar, South Sulawesi Provincial Health Office, Makassar City Health Office, and Menggala District Health Center with the assistance of local cadres synergized to carry out Sentinel Surveillance of Rat Density and Leptospirosis Detection in Manggala District, Makassar City, South Sulawesi Province from September 19- 23, 2023 [11].

In 2019 in Enrekang district, 1 case of leptospirosis and there are still 2 people suspected of leptospirosis, in Pinrang district 1 case, in 2020 in the district. Wajo 1 case, in 2022 in the district. Sidrap 1 suspected case, in the district. Pangkep 1 case. As of March 2023 in the district. Pangkep there have been 4 cases of leptospirosis. While in 2019 in the district. Enrekang and in 2021 and 2022 in Wajo district, district Enrakang and Pangkep districts have carried out surveillance of rats and detection of leptospirosis in rats [12].

Leptospirosis is one of the diseases originating from rats that needs serious attention Transmission of leptospirosis from animals to humans (zoonosis). [13] Leptospirosis is transmitted directly and indirectly through the urine or organs of rats containing *Leptospira* bacteria, Transmission of leptospirosis to humans through the urine of infected animals or can be through soil and water contaminated with urine containing *Leptospira*

bacteria Leptospirosis disease is spread in various countries around the world. Leptospirosis occurs mostly in tropical areas with poor environmental or sanitary conditions. Leptospirosis is endemic which occurs throughout the year, especially in flooded areas during the rainy season because one source of leptospirosis transmission comes from rat urine contaminating flood water [14].

The spread of rats can cause bubonic plague, in Indonesia can not be separated from the work in the market as a cut-off point for advances in transportation, travelers and products together may be a way to change the spread of diseases affecting the general welfare due to isolated infections, new emerging diseases, and infections that can not be rejected old diseases that recur (reappearing diseases) [15] Several strategies have been created to control rats including disinfection, special culture, physical, mechanics, and science [9].

Utilization of bait for rat control is an applied basic and simple control technique. In addition, the utilization of traps is also a protected technique and does not represent a gamble on the climate and its utilization. In field trap applications, it is usually combined with the application of bait to the trap. Utilization of bait to control rats is a strategy that can actually be done but is less potent seen by the general public as one of the rat control strategies." [17]

Rats in urban areas favor foods such as meatballs and sausages. This is influenced by the way rats in general tend to favor consumable foods in their habitat." [18] Sausages are also used to attract rats due to their availability Sausages are generally easy to find in many households and food stores Their wide availability makes them an option for some people trying to control rats without using specially designed rat baits. [19] Scent and Taste Sausages have a strong smell and taste that may be attractive to rats The content of certain ingredients in sausages may attract rats. [20].

MATERIAL AND METHOD

The method used in this study is an experiment to describe the success of catching rats with 24 live traps and four different types of food bait, namely, meatballs, mashed shrimp sausage (powder) and sweet potato mixed with peanut butter spread randomly around the image market area of Baraka, Enrekang Regency. Rats were collected in 4 repetitions and counted, identified and preserved. Mouse morphological data were analyzed descriptively and described qualitatively.

The tool used in this study is a rat trap, which is a live trap with a size of 31cmX26cmX15cm. This trap is used with the aim that the caught rats remain in one piece so that they are easier to recognize. Masks and gloves are used to protect themselves from bacteria found in mice and avoid the smell of mice. Trash bags are used as traps if you have found mice. The materials used in this study are rat traps, rat bait meatballs, sausages, dried shrimp (powder) and sweet potatoes mixed with peanut butter. These devices are used to lure rodents (mice) into the traps that have been set.

RESULTS

This study used four types of bait . The number of individual rats obtained based on the type of bait is presented in the following table:

Table 1: Rat Preference for Meatball Bait

| No | Time | Feed type | Number of traps | Location A | Location B | Location C | Number of mice caught (preference) |
|--------------|----------|-----------|-----------------|------------|------------|------------|------------------------------------|
| 1 | 07 March | Meatballs | 6 | 1 | 0 | 0 | 1 |
| 2 | 08 March | Meatballs | 6 | 1 | 0 | 1 | 2 |
| 3 | 09 March | Meatballs | 6 | 0 | 0 | 1 | 1 |
| 4 | 10 March | Meatballs | 6 | 0 | 0 | 0 | 0 |
| Total | | | 24 | 2 | 0 | 2 | 4 |

Primary data source 2024

The data in Table 1 above shows that the results of the rats' preference for meatball bait for 4 days given randomly in 3 locations, in location A (vegetable seller area) there were 2 rats, location B (fish seller area) there were no rats and location C (trash can area) there were 2 rats with a total of 4 rats.

Table 2.Rat Preference for Sausage Bait

| No | Time | Feed type | Number of traps | Location A | Location B | Location C | Number of mice caught (preference) |
|--------------|----------|-----------|-----------------|------------|------------|------------|------------------------------------|
| 1 | 07 March | Sausages | 6 | 0 | 0 | 0 | 0 |
| 2 | 08 March | Sausages | 6 | 0 | 1 | 0 | 1 |
| 3 | 09 March | Sausages | 6 | 0 | 0 | 0 | 0 |
| 4 | 10 March | Sausages | 6 | 0 | 1 | 0 | 1 |
| Total | | | 24 | 0 | 2 | 0 | 2 |

Primary data source 2024

The data in Table 2 above shows that the results of the rats' preference for sausage bait for 4 days given randomly in 3 locations, in location A (vegetable seller area) there were no rats, location B (fish seller area) there were 2 rats and location C (trash can area) there were no rats, with a total of 2 rats obtained.

Table 3.Rat Preference for Dried Shrimp Bait (Powder)

| No | Time | Feed type | Number of traps | Location A | Location B | Location C | Number of mice caught (preference) |
|--------------|----------|-----------|-----------------|------------|------------|------------|------------------------------------|
| 1 | 07 March | Shrimp | 6 | 1 | 1 | 0 | 2 |
| 2 | 08 March | Shrimp | 6 | 0 | 1 | 1 | 2 |
| 3 | 09 March | Shrimp | 6 | 1 | 2 | 0 | 3 |
| 4 | 10 March | Shrimp | 6 | 1 | 1 | 1 | 3 |
| Total | | | 24 | 3 | 5 | 2 | 10 |

Primary data source 2024

The data in Table 3 above shows that the results of rat preference for dried shrimp bait (powder) for 4 days given randomly in 3 locations, in location A (vegetable seller area) there were 3 rats, location B (fish seller area) there were 5 rats and location C (trash area) there were 2 rats, with a total of 10 rats obtained.

Table 4. Rat Preference for Sweet Potato Bait Mixed with Peanut Butter

| No | Time | Feed type | Number of traps | Location A | Location B | Location C | Number of mice caught (preference) |
|--------------|----------|--------------|-----------------|------------|------------|------------|------------------------------------|
| 1 | 07 March | Sweet potato | 6 | 0 | 0 | 1 | 1 |
| 2 | 08 March | Sweet potato | 6 | 1 | 0 | 0 | 1 |
| 3 | 09 March | Sweet potato | 6 | 1 | 0 | 1 | 2 |
| 4 | 10 March | Sweet potato | 6 | 0 | 0 | 0 | 0 |
| Total | | | 24 | 2 | 0 | 2 | 4 |

Primary data source 2024

The data in Table 4 above shows that the results of rat preference for sweet potato bait mixed with peanut butter for 4 days given randomly in 3 locations, in location A (vegetable seller area) there were 2 rats, location B (fish seller area) there were no rats and location C (trash area) there were 2 rats, with a total of 4 rats obtained.

Table 5. Recapitulation of Rat Bait preferences across the Study Area

| No | Time | Feed type | Number of traps | Number of mice caught (preference) | Success Trap (%) |
|--------------|-------------|----------------------------------|-----------------|------------------------------------|------------------|
| 1 | 07-10 March | Meatballs | 24 | 4 | 16,67 |
| 2 | 07-10 March | Sausages | 24 | 2 | 8,33 |
| 3 | 07-10 March | Shrimp (powder)) | 24 | 10 | 41,67 |
| 4 | 07-10 March | Sweet potato mixed peanut butter | 24 | 4 | 16,67 |
| Total | | | 96 | 20 | 20,83% |

Primary data source 2024

From the results of Table 4 above shows that the overall results of four different types of bait given randomly in location A (vegetable seller area), location B (fish seller area), and location C (trash can area) for 4 consecutive days, shrimp bait (powder) is most favored by rats there are 10 rats with success trap 41, 67 (%), compared to other baits such as meatballs there were 4 rats with a success trap of 16.67%, sausages there were 2 rats with a success trap percentage of 8.33 (%) and sweet potatoes mixed with peanut butter there were 4 rats with a success trap of 16.67 (%) so a total of 20 rats were found.

DISCUSSION

1. Rat preference for meatball bait

The results of this study showed that meatball bait was able to catch mice with a percentage of 16.66%, while other baits, namely sausage with a percentage of 8.33% shrimp (powder) 41.66% and sweet potato bait mixed with peanut butter 16.66% This study shows that the success rate of catching mice using sausage bait is smaller than the success rate of catching mice using meatball bait which reached 16.66%. The results of catching mice during the study showed that dried shrimp attracted more mice in the trap, this is because the shrimp aroma is sharper than other baits.

Meatball bait was used in this study because meatballs have a lot of nutritional

content in the form of protein, vitamins, calcium, iron, calories, and fat, meatballs also contain 218 calories, 8.18 carbohydrates, 13.4 grams of protein, and 14.22 grams of fat, because of the large content of meatballs, many people consume meatballs, meatballs also have a savory taste and meatballs produce enzymes that divide meatball fat into fatty acids so that it has a touch of flavor that produces a distinctive aroma so that it can attract the attention of mice. [23].

2. Rat preference for sausage bait

The results of this study indicate that sausage bait with a percentage of 8.33% This study shows that the success rate of catching rats using sausage bait is smaller

than the success rate of catching rats using meatball bait, dried shrimp (powder) and sweet potato mixed with peanut butter.

Rats love sausages because meat is a highly nutritious food and has a taste that consumers like. Meat naturally contains several functional components for the body such as anserine, and taurine. The functional value of meat can be increased by processing, one of which is by making sausages. Based on the observations of the Makassar MPA in 2021, it was found that successively the most effective bait in controlling rats was sausage (50%), because sausage is yellow in color so that it can attract the attention of rats. meatballs (30%), peanut butter sweet potatoes (10%) and shrimp as a control (10%). Similar observations were made by Muammar in 2020 at Paotere Port to determine the most effective bait for rat control. The results obtained from the installation of each bait trap in order are yellow corn as many as 3 tails (20% /), ripe papaya as many as 2 tails (13.3%), young cucumber as many as 1 tail (6.67%) and apple fruit as many as 1 tail (6.67%) [69].

3. Rat preference for dried shrimp bait (powder)

The results of this study showed that shrimp bait (powder) with a success rate of 41.66% was higher than other baits such as meatballs, sausages and sweet potatoes mixed with peanut butter. Dried shrimp is used as bait because it has a pungent odor so that it can attract rats into the trap, besides catching rats using mashed dried shrimp bait (powder) is commonly done for catching rats in settlements [63].

Mice love the strong aroma and flavor found in dried shrimp. Dried shrimp has an odor and taste that is very attractive to mice. In addition, dried shrimp has a crunchy texture and is easily eaten by rats. This makes it a very appetizing food for rats. In addition, dried shrimp also contains protein and other nutrients that rats need to survive and reproduce. The combination of these factors makes dried shrimp a very favorable food for rats."[3] Another factor is that dried shrimp contains good nutrition, because it contains protein and carbohydrate content. very high protein

content and rats use protein to produce energy that is useful for carrying out activities. Energy is the result of the metabolic process of organic nutrients consisting of carbohydrates, proteins and fats[2] They can survive in cold or hot temperatures, and can last long enough without having to be put into special storage conditions. This makes shrimp a practical and easy-to-use bait, especially in market environments that may not always have optimal storage facilities."[70]

4. Rat preference for sweet potato bait mixed with peanut butter

The results of this study showed that sweet potato bait mixed with peanut butter with a capture success rate of 16.66% was quite successful compared to sausage bait. Sweet potatoes were used as bait in this study because rats like to eat sweet potatoes, sweet potatoes contain quite high nutrients, such as carbohydrates, fiber, and some vitamins. In addition, the texture and sweet taste of sweet potatoes can also be an attraction for rats. So, apart from the color, the nutritional content and taste of sweet potatoes are the reasons why rats like them."[64]

Rats love sweet potatoes because they have a strong sweet flavor and soft texture, making them an attractive food for rats. In addition, sweet potatoes are also rich in carbohydrates, which are an important source of energy for rats. Apart from being sweet, sweet potatoes also contain several important nutrients such as fiber, vitamins, and minerals. This makes it a good food choice for rats to maintain their health. In addition, sweet potatoes can also be found easily in various places, such as gardens, fields, or even in food storage. The availability and durability of sweet potatoes make them a preferred and often sought-after food for rats."[21]

From the overall results of the bait above, it can be interpreted that the success trap produced is higher by 41.66% of 24 frames in 4 days, the results of the above analysis can be interpreted that the most effective bait for catching rats is dried shrimp (powder). The results showed that there were 4 rats with meatball bait, obtained 2 rats with sausage bait, obtained 10 rats with dried shrimp bait (powder) and

obtained 4 rats with sweet potato bait mixed with peanut butter obtained at the baraka image market, baraka sub-district, enrekang district. Referring to research (Muhammad Haidar 2022) This is because rats live in housing or human settlements and rats are also called commensal rodents whose lives depend on human activities. Home habitats are very favored by rats because of the many strategic places to find food, breed and hide. Residential areas are ideal habitats and are very favored by rats because there are many varied food sources so that rats feel at home in settlements. *Rattus tanezumi* and *Suncus murinus* are often found in residential areas because their main habitat is human settlements as well as in the yard [23].

CONCLUSION

1. There were 4 mice trapped on meatball bait during 4 repetitions with a capture success rate value of 16.66%.
2. Mice caught on sausage bait during 4 repetitions of the date there were 2 mice with a success rate of 8.32% trap success
3. Mice caught on dried shrimp bait (powder) for 4 repetitions there were 10 mice with a capture success rate of 41.66%.
4. Mice caught on sweet potato bait mixed with peanut butter for 4 repetitions there were 4 mice with a capture success rate of 16.66%.

SUGGESTION

Based on the results of the thesis research on "rat bait preferences in vector control efforts at the Citra Baraka market, Enrekang district", which has been carried out, the following suggestions can be conveyed:

1. For the Citra Baraka Market community to be able to better maintain market cleanliness so that the market environment is free from vectors carrying leptospirosis disease in rats.
2. It is suggested to the Citra Baraka Market community, to minimize the existence of holes that can act as an entry point for rats.
3. To control disease-carrying rats, researchers suggest that the market community is expected to use the most effective bait, namely dried shrimp (powder).
4. The Citra Baraka Market community is expected to control rats in their respective stores.
5. For future researchers, it is expected to choose a better location to be used as a

research location such as conducting research in settlements.

6. For future researchers, they can use different replication methods such as the first replication of the first bait installation, the second replication of the second bait installation and so on.
7. Future researchers are expected to use different types of traps such as powder traps.

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