

## Prevalence and Severity of Scabies (*Sarcoptes scabiei*) on Rabbits in Kuala Lumpur City

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### Abstract

This study intends to know the prevalence and crusting severity of scabies (*Sarcoptes scabiei*) on Rabbits in Kuala Lumpur Rabbit Farm. *Sarcoptes scabiei* var. *cuniculi* is a mite that has a predilection in the stratum corneum of the skin and caused scabies. Clinical symptoms were characterized by alopecia and crusting in the skin. This study presents a laboratory explorative research with a cross-sectional approach. Samples used rabbits in the farm that showed the clinical symptoms of scabies and the result of scraping skin in a native examination at the laboratory. Rabbits that positive scabies then performed scoring by the severity based on the region of the body and clinical symptoms. Results showed that from 140 rabbits in the population, the positive result is 13 rabbits were infected by scabies and there were 2 grades of crusting severity of scabies consist of mild and moderate grade with separated 2 regions of the body. The low grade showed the alopecia and crusting in the face region while the medium grade in the face and foot region. The conclusion of this study is the number of prevalence scabies is 9.29% and crusting severity that low grade is 69.32% and medium grade is 30.78%.

**Keywords:** Kuala Lumpur, crusting severity, prevalence, rabbit, scabies, *Sarcoptes scabiei*

### Introduction

Rabbits in Kuala Lumpur is an animal protein that is consumed by local people and besides it is also used as a companion as a pet. In this case, Kuala Lumpur has a tropical rainforest type of climate (Abdul R. and Ismail, 2008), which is hot and sunny with abundant rainfall and an average rainfall of 2,500 to 3,000 mm (98-118 in) rainfall per year. This situation supports the existence of rabbit farms with superior breeds as well as favorable climate. In the development of rabbit farming, there are still many diseases that attack rabbits, one of the often found diseases in rabbits are scabiosis with varying degrees of severity and prevalence.

Based on Wardhana *et al.*, (2006) *Sarcoptes scabiei* can attack the ears, skin, limbs, and corners of the mouth and cause to ensure difficulties in eating and even leads up to death, and it's possible to cause economic losses by decreasing feed conversion, and also the usage of drugs to overcome scabiosis, especially acaricides such as vitamin A, minerals, and to cope with secondary infections such as anthelmintics, antibiotics, and fungicides, meanwhile the production costs increases and ultimately lowers

the gain (Wong *et al.*, 2015). Rabbits with scabiosis have a fairly high mortality rate ranging from 15-40%, this can occur starting from birth to weaning due to the disease (Masanto and Agus, 2011). Factors that influence diseases are poor sanitation (Lastuti *et al.*, 2018). Scabiosis is a skin disease caused by *Sarcoptes scabiei*, which is included in the class of Arachnida (Kuizheng *et al.*, 1994). These mites are very small and can only be seen with a microscope or microscopic. Scabiosis are often called itchy mite (McCarthy *et al.*, 2004). This disease can easily transmit from animals to animals, animals to humans, and vice versa. Scabiosis easily spread either directly or indirectly, it can also spread quickly to a community of animal as that they live together so that the treatment must be carried out simultaneously and comprehensively to the infected rabbits and the environment in the community that has Scabiosis (Raji *et al.*, 1997) because it will easily re-contracted if carried out individually.

Scabiosis is also said as an infectious skin disease with clinical symptoms of itching and a skin rash, which are caused by sensitization (a type of "allergic" reaction) to the proteins and



feces of the parasite. Severe itching (pruritus), especially at night, is the earliest and most common symptom of scabies. A pimple-like (papular) itchy (pruritic) "scabies rash" is also common. Itching and rash may affect much around the face, neck ears around the body (Johnston and Sladden, 2005). Scabiosis causes symptoms of discomfort because it gives rise to lesions that can cause to increase in the mortality rate (Bornstein and Samuel, 2001). Symptoms of discomfort from scabiosis are caused by ectoparasites. Ectoparasites are a parasitic organism that lives on the surface of the host's body, sucks blood or foraging on the surface of the hair, and fur (Lastuti *et al.*, 2018).

The analyzed effects of environmental climate factors on this incidence in Kuala Lumpur has the major factor in increasing the severity of Scabiosis whereas statement supports the prevalence and severity of scabiosis in rabbits are slightly high this is why it is necessary to conduct a study on the rabbits in Kuala Lumpur and this, can be used as a prevention of treatment according to the way best and true and the expected incidence to be controlled.

## Methods

### Research Design

This research is a cross-sectional study with laboratory exploration which will then be tested using the chi-square and Kruskal Wallis and continued with the Z test method. The data obtained will be processed in the SPSS program. The sample used in the form of rabbits infected with Scabiosis clinical symptoms and results of scraping or skin scrapings. 140 samples are calculated from the number of rabbits which showed clinical symptoms of Scabiosis and Scabiosis positive through laboratory tests that indicate the presence of the mite *Sarcoptes scabiei*.

This research conducted in 4 rabbit breeding farms : Qais Tajul Agro Farm, Varisty Agro Farm, Ms Garden Rabbit Farm, and Tatoni Smart Rabbitry located in the City of Kuala Lumpur or Klang Valley and examination is conducted in the Multipurpose Laboratory of Goon International College between July to September 2020. The materials that used in this research are gloves, antiseptic (alcohol 70%), cotton, petri dish, scalpel, disposable pipet and spuite, object-glass, cover glass, and microscope. Samples of scrapings or skin scrapings were added with 10% KOH to dissolve the crust.

## Data Analysis

According to (Davis *et al.*, 2013), for a crust or scab of Scabiosis, there is no standard way to describe the level of severity. However, clinical assessment scales have been developed. By using a scale to determine the severity of the infestation following the grade/level 1, 2, or 3 which shows the level of mild, moderate, or severe in severity based on the distribution and extensive hardening of the skin (crust), the appearance of the crust, history of disease events and conditions skin. The number of positive and negative observations towards rabbits with Scabiosis is observed under the chi-square test, and the severity through Kruskal Wallis continued by Z test.

## Results

### Prevalence of Scabies in Rabbits

The prevalence of scabies in rabbits in Kuala Lumpur City, Malaysia is 9.29% with 13 positive samples from a population of 140 rabbits. These results are based on calculations with formulas, and where the total prevalence calculated was majorly 9.29%. The 13 rabbits were found with symptoms that characterized by the surface of the skin like scab/crust, scaly, alopecia, papules, hyperemia, and the unappealing skin condition. Meanwhile, other rabbits that do not show any clinical symptoms that characterize on the surface of the skin are not scraped on the skin to be continued in the laboratory examination. This examination is carried out on several regions of the rabbit's body. Regional division in the body of the rabbit includes the region of the face, limbs, and body.

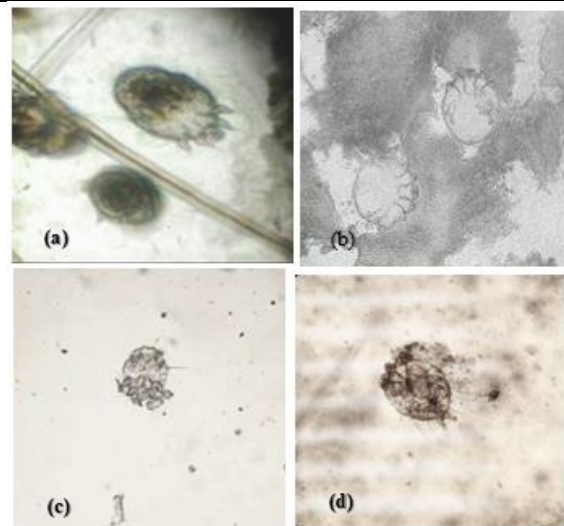
The results of the examination also showed that clinical symptoms such as alopecia and crusting were also present in the leg region which included the forefoot. and hind legs. Clinical examination results can be seen in Figure 1. Microscopic images of rabbit skin scrapings show a picture of *Sarcoptes scabiei* forms that grow and multiply on the surface of rabbit skin, causing scabies (Figure 2). An overview of the results of scabies rabbit skin scrapings in various stages of *Sarcoptes scabiei* mite development can be seen in Figure 3.



**Figure 1.** (A) Clinical symptoms of scabies in the form of alopecia and mild crust around the body region. (B) Clinical examination of rabbits with clinical symptoms of scabies in the form of alopecia around the face whereas nose and eyes region.



**Figure 2.** *Sarcoptes scabiei* mite on the results of native skin scrapings under a microscope with a magnification of 100x.



**Figure 3.** Examination of skin scrapings found *Sarcoptes scabiei* in the development stage of (a) egg; (b) larvae; (c) nymphs; (d) adult.



**Figure 4.** Rabbit with scabies severity level. (Right) Shows a rabbit with a mild scabies severity and (Left) rabbits with moderate severity.

Figure 4 (Right) shows a rabbit with a mild scabies severity. Rabbits with this severity found clinical symptoms in the form of alopecia and crusting in the facial region including the mouth, nose, eyes, and ears. Rabbits with moderate severity have clinical symptoms in the form of alopecia and crusting in the facial and body regions which can be seen in below in Figure 4 (Left).

#### Assessment of the Severity of Scabies in Rabbit Farms

The results of the assessment of the severity of scabies crusts based on several components such as distribution and area of crusts, the

thickness of crusts, history of disease events, and skin conditions as well as the percentage of scabies crusts based on distribution body regions

of rabbits with crusting and alopecia, in 13 rabbit samples the results were shown in Table 1 below.

**Table 1.** Scabies Severity Assessment Results

Sample	Region	Clinical Symptom	Score/Grade	Total Score	Severity Level
K <sub>1</sub>	2	2.3	6	6	Mild
K <sub>2</sub>	3	3.3	9	9	Moderate
K <sub>3</sub>	1	1.2	2	2	Mild
K <sub>4</sub>	1	1.2	2	2	Mild
K <sub>5</sub>	1	1.3	3	3	Mild
K <sub>6</sub>	2	3.3	9	9	Moderate
K <sub>7</sub>	1	1.2	2	2	Mild
K <sub>8</sub>	1	1.3	3	3	Mild
K <sub>9</sub>	1	1.3	3	3	Mild
K <sub>10</sub>	1	1.3	3	3	Mild
K <sub>11</sub>	1	1.3	3	3	Mild
K <sub>12</sub>	3	3.2	8	8	Moderate
K <sub>13</sub>	3	3.3	9	9	Moderate

## Discussion

### Prevalence of Scabies in Rabbit Breeding

This studies conducted to determine the prevalence and severity of *scabies*. The results showed that there was 9.29% prevalence of *scabies* on rabbits in Kuala Lumpur rabbit farms.

In the observation of the results of this study, several developmental stages were determined based on their morphology. Male mites are 213-285 µm long and 162-210 µm wide, while females are 300-504 µm long and 230-420 µm wide. Female mites lay their eggs on the edges of wounds or skin pores, resulting in 40 - 90 eggs. These eggs hatch 1-5 days into six-legged larvae. Larvae develop into eight-legged nymphs but do not yet have genitals. And finally from the nymph phase formed adult mites. The life cycle of *Sarcoptes scabiei* is almost the same in livestock. This mite enters the stratum corneum skin. Adult mites lay eggs with 2-3 eggs per day per mite with an incubation period of up to 2 months (Williams *et al.*, 2000).

In scabies diagnosis, a comparative diagnosis should be noticed. According to Soulsby (1986), *scabies* can be confused with several other skin diseases namely ringworm and demodectosis. In ringworm disease does not cause thickness on the skin, it is usually found on the skin around the hair roots causing hair loss on the hair or fur. Ringworm does not cause pimples on the skin, but there is dry skin that

forms scales around the circular hair roots. In demodectosis, there is a crust on the skin, tangled hair but the skin becomes thick. Both the disease primarily affects the skin surface or superficial while *S. scabiei* causes scabies to infect cattle by creating tunnels in the skin. Prurigo and dermatitis are also comparable diagnoses of *scabies*. Clinical symptoms of prurigo are similar to *scabies* due to the presence of papules and nodules on the skin accompanied by lichenification. Dermatitis caused by the fungus also causes lichenification or crusty and folded skin, in dogs it is difficult to distinguish from squamosa type demodectosis (Arlian and Marjorie, 2017).

In this rabbit farm, it is found that the location of the cage that is exposed to sunlight will indirectly, result in a low incidence of *scabies* due to the condition of the cage is not damp and clean. This is in line with the statement according to Deshmukh *et al.*, (2010), cage sanitation, and the poor environment is also thought to be a major factor in the spread of *scabies*. The cage looks less sunlight, due to the humid condition of the cage. Moist places can cause mites to survive for more than 30 days.

Regarding to sex, male rabbits were found to have higher prevalence with 53.86% than females with 30.88%. Higher prevalence of lesions in female was detected on the young rabbits, although no hypothesis was given to explain these differences. If female rabbits are also more prone to suffer and eventually die from mange, this may explain the observed higher prevalence in males. On the other hand, males seem to have higher contacts with other rabbits rather than females because they occupied larger home ranges and are in charge of the territory defense. Additionally, this was might be due to the area of people use one male for many flocks of rabbits, due to this the males have opportunity to frequent contact with infected rabbits.

Similarly the higher prevalence of scabies 76.92% in young rabbits as compared to older rabbits follows 23.81% may be due to keeping young and adult animals together thus getting infection through direct contact. Additionally, in Kuala Lumpur the farmers are well acquainted with modern livestock management practices which control the prevalence to be controlled on order.

The incidence here shown conclusly among 4 rabbits farms with low results of *scabies* in livestock has spread widely throughout farms an increased especially on the case such of feed shortages and in a dirty cage environment with a

prevalence of 4-11%. The onset of the disease is patterns and habits, one of the dominant factors is the lack of water supply or living together with relatively close contact (Walton and Currie, 2007). This occurs usually during a shortage of food, in a dirty cage environment, and the dry season because livestock are rarely bathed and the wind helps to spread the disease scabies more widely, as well as due to direct contact between infected livestock and healthy livestock while in the barn or pasture that there are many livestock grazing together (Alasaad *et al.*, 2009). As well to make up there were farms that does not obtain sunlight, less of hygienic and compacted cage, they do also prevent it by rabbits with clinical symptoms are quickly given Ivermectin, as a precaution to avoid the diseases to spread widely and the keep up the prevalence on effected rabbits.

### Severity Level of Scabies in Rabbits

Based on clinical symptoms that characterize scabies in the form of alopecia and crust, can be assessed the severity of scabies. Determination of the severity of scabies based on the results of scoring/assessment of scabies according to Davis *et al.*, (2013) of several components such as the distribution and extent of crust, crust thickness, history of disease events, and skin conditions and percentage of presence of crust due to scabies. The division of several regions of the body is also the basis for grouping the severity of scabies.

Clinical manifestations such as development of scales, scabs, crusts and alopecia along with a large number of mite, crusts are observed in present study were consistent with findings of Oraon *et al.*, (2000) and Chandey *et al.*, (2000). Such pathogenic effects of these mites have been attributed to their burrowing activity and mechanical damage caused by parasites during excavation, irritant action of their secretions and excretions (Darzi *et al.*, 2007). The rabbits showed pruritis and were intermittently scratching area with front paws. Later, hemorrhagic crusts with fissures developed.

In the assessment of the severity of the basis of clinical symptoms in the form of alopecia and crust in the body of a rabbit, according to Morsy *et al.*, (1989), the pathogenicity of scabies is divided into 3 phases, namely the first phase, occurring 1-2 days after infestation. Mites begin to penetrate the epidermal layer. In the second phase, the mites are under the keratin layer, the surface of the skin has been covered by a thick

due to poor hygiene crust/scab. Hair loss occurs in this phase and occurs after 4-7 weeks of infestation. In the third phase looks crust begins to peel so that the surface of the skin again visible in small holes. This last phase occurs 7-8 weeks after infestation it appears that several mites leave traces of the hole.

The results of the *chi-square* test showed that there was no relationship between the face and limb region and the severity of the region that was associated with clinical symptoms of scabies. This is related to parasitic infections caused by *Sarcoptes scabiei* mites infecting the body of a rabbit that can attack any part. In each region can be seen in the results that the clinical symptoms that appear are not the same even in the concept of pathogenicity or the severity of scabies. Whereas the *Kruskal Wallis* test showed that there was no significant difference between the region and clinical symptoms. This is related to the scabies infection, cannot be determined directly by the location or the presence of clinical symptoms. On the dimension result reading, the Z test results obtained in which the facial region there are more clinical symptoms than the limb region. Whereas clinical symptoms such as severe alopecia can be found equally as large in the face and limb region.

## Conclusion and Suggestion

### Conclusion

The conclusions that can be drawn from the results of research on the prevalence and severity of scabies (*Sarcoptes scabiei*) in rabbits in Kuala Lumpur City are the prevalence rate of scabies in rabbits in farms in Kuala Lumpur is 9.29% and the severity of scabies in rabbits in in farms Kuala Lumpur is divided into 2, namely mild and moderate severity. The level of mild severity was 69.23% and moderate severity was 30.78%.

### Suggestions

Based on the research results, the following suggestions can be made were rabbit breeders in Kuala Lumpur City should maintain and further improve their husbandry management and they need to pay attention for parasitic disease control, especially in mite infestations, therefore in future studies, research should be carried out on the types and doses of drugs to treat cases of scabies in rabbits associated with the severity scabies.

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