STUDY ON THE PERFORMANCE OF THE eKASIH SWIFTLET HOUSE – A LOW COST ALTERNATIVE TO PROMOTE THE SWIFTLET INDUSTRY

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ABSTRACT. The Department of Veterinary Services (DVS) established a subsidy programme to build low cost swiftlet houses, under the auspices of the eKasih programme. This programme is aimed at aiding entrepreneurs in the swiftlet industry to produce good quality bird's nests. In 2013, eleven swiftlet houses under eKasih Program in Johor, Perlis and Pahang were chosen randomly to be evaluated after a year of completion. The main factors affecting its functionality, such as temperature, relative humidity and light intensity inside the swiftlet houses were recorded and analysed. The results showed that most of the eKasih swiftlet houses built under this programme did not meet the recommended in house conditions due to several reasons. The houses built in this programme failed to attract the birds into the houses to build nests. Although there were some houses that produced bird's nests, it was found to be substandard in terms of quality. Thus, this study revealed the importance of various factors needed for the successful establishment of swiftlet houses to produce good quality bird's nests.

Keywords*:* Swiftlet, swiftlet house, eKasih program, temperature, relative humidity

INTRODUCTION

The edible bird's nest industry is a lucrative business which has existed for hundreds of years. Despite the swiftlet industry being explored widely in neighbouring countries such as Indonesia and Thailand, this industry is still in its infancy in Malaysia. One of the main reasons is the high cost of building a swiftlet house; which however, does not guarantee profits for the investor. In this context, the Department of Veterinary Services (DVS) aims to facilitate swiftlet outlets by providing information on suitable methods of improving the output of bird's nests, thereby increasing productivity and reducing losses.

Thus, under eKasih programme, the DVS built swiftlet houses costing an affordable RM10, 000 per unit. The eKasih programme is a subsidy programme established specially for poverty-stricken families who earn less than RM1,500 (urban) or RM1,000 (rural) per month. As a result, in 2009, the construction of eKasih swiftlet houses were initiated and now there are 295 units existing throughout Malaysia including Sabah and

RE# MJVR -0044-2014

Sarawak (DVS, 2012). However, based on the data recorded by DVS, only 25% of the swiftlet houses have been successfully producing bird's nests. Therefore, this study was conducted to focus on the design of the swiftlet houses by evaluating materials used in building the house, internal temperature maintainance, relative humidity and luminance which is expected to contribute to the success of the project.

MATERIALS & METHODS

a) Study sites

Site visits were performed on eKasih swiftlet houses in Johor (Batu Pahat and Muar), Perlis (Kuala Perlis and Sanglang) and Pahang (Bera, Jerantut and Raub).
The method used in this study is observational, in addition infrastructure measurements of the houses to estimate the built up area and materials used was recorded. The temperature, relative humidity and luminance inside the swiftlet houses were measured using a 4-in-1 Industrial Thermometer Light Humidity Meter.
In addition data such as the presence of swiftlets and the existence of commercial swiftlet houses in that area was also been monitored.

i) Location : Johor

There are two designs of eKasih swiftlet houses in Johor as shown in Figure 1 and Figure 2, respectively. The first design, as shown in Figure 1, used the concept of a Jack Roof, with the walls and floor made from plywood boards without insulation inside the house. While the second design as shown in Figure 2 used the concept of Shed Roof , and utilises a double layer wall which made up of plywood boards for the inside wall and plaster boards for the outside wall. Both designs have an area of 16 x 8 sq feet. There were three swiftlet houses in Johor which were evaluated in this study; identified as H1, H2 and H3. The H1 used the Jack Roof design, while H2 and H3 are used the Shed Roof design.

ii) Location: Perlis

All the eKasih swiftlet houses built in Perlis utilise the design as shown in Figure 3,which uses the concept of Gable Roof. The floors were made of plywood boards while the walls were made of cement coating insulated with plywood boards inside the house. The original design includes the upper floor, but with an additional layer of concrete on the ground floor which was made to strengthen the building to withstand the onslaught of strong winds in that area. There are five swiftlet houses in Perlis, each with an area of 16 x 8 sq feet; identified individually as H4, H5, H6, H7 and H8.

iii) Location: Pahang

The eKasih swiftlet houses in Pahang have a Gable Roof design and use fibre cement boards for walls and floor. All have the same design as in Figure 4 but are of different sizes. The house identified as H9 measures 16 x 28 sq feet and belonged to two eKasih participants; hence it was bigger than other individual houses. The other houses measured 16 x 10 and 16 x 8 sq feet, and were identified as H10 and H11, respectively.

All data were recorded during the site visits analysed for comparisons between all the eKasih swiftlet houses. Table 1 shows the time of visit and weather conditions during the site visit.

RESULTS AND DISCUSSION

A total of 11 out of 16 houses were evaluated by visual observation and as the owner was absent during some of the site visits; there were cases of incomplete data. The swiftlet houses in Johor and Perlis were considered inefficient because the houses failed to produce any bird nests 3 years after completion. The houses also were observed to be empty without any trace of the presence of swiftlets inside the houses. Meanwhile, the swiftlet houses in Pahang have resulted in production of bird's nests, but the nests were of low grade being too dry and brittle.

Table 1. Time and weather condition during data collection

No	State	ID	Time	Weather
1	Johor	H1	8.30 am	Cloudy
2		H2	9.45 am	Cloudy
3		H3	2.40 pm	Cloudy
4	Perlis	H4	9.10 am	Sunny
5		H5	10.55 am	Sunny
6		H6	11.10 am	Sunny
7		H7	11.30 am	Sunny
8		H8	11.55 am	Sunny
9	Pahang	H9	1.00 pm	Sunny
10		H10	9.30 am	Rainy
11		H11	4.00 pm	Sunny

Table 2. Readings of Temperature, Relative Humidity and Illuminance inside visited swiftlet house

No	State	ID	Temperature (°C)	Relative humidity (%)	Illuminance (Lux)
1	Johor	H1	28.0	76.8	9.0
2		H2	27.8	80.9	5.0
3		H3	28.7	78.1	3.1
4	Perlis	H4	29.0	83	13.0
5		H5	34.3	73.4	6.0
6		H6	33.1	72.9	14.0
7		H7	33.1	72.9	14.0
8		H8	33.3	71.2	18.6
9	Pahang	H9	30.0	65	7.0
10		H10	26.9	77.7	3.0
11		H11	35.5	62.6	14.0

Table 2 shows the data of temperature, relative humidity and illuminace taken from inside the swiftlet houses. Meanwhile, Figure 5, Figure 6 and Figure 7 show the comparison between the actual readings from the houses with maximum and minimum recommended conditions.

i) Temperature

There are a number of opinions on ideal internal temperature for a swiftlet house. A study done Ibrahim *et al*., (2009), found that the temperature should be between 26°C to 35°C () for maximum benefit. However, other researchersexpressed that the ideal temperature is between 27.5°C to 30°C (Lim, 2009). Temperature plays important role in ensuring a good harvest of bird's nests. From the data obtained, most of the houses had temperatures between 26.9°C to 35°C, except H9 which had a slightly higher temperature, 35.5°C (Figure 5). The ambient temperature is essential to provide a suitable environment for the swiftlet as this habitat will contribute towards the bird's nest productivity.

ii) Relative Humidity

The relative humidity proposed by Ibrahim and Lim in their studies, are also different. Ibrahim *et al*., (2009) suggested the ideal relative humidity to be within 80% to 90%, while Lim (2009) has recommended within 75% to 80%. Relative humidity is one of the important factors that will also affect the quality of the bird's nest (Lim, 2009). Only five out of eleven swiftlet houses that were visited achieved a humidity between 75% - 90%. The rest showed readings

below 75% (Figure 6). A higher humidity will cause the nests to become yellowish in colour and that will fetch a lower price for the nest. On the other hand, a lower humidity causes the nest to be dry and fragile. This probably happened to the nests produced from the houses in Pahang, where humidity was recorded between 60% to 65%. It was noted that the owner sold the bird's nest for a lower price, namely RM100 for 32 pieces of bird's nests (personal communication).

Although all the houses are equipped with a humidifier machine to maintain the optimal humidity, most of the owners were reluctant to use the machine as it would lead to additional cost, as was observed during the site visit

iii) Illumination

The house must be designed as close as possible to the natural environment of the bird's habitat. According the previous studies, the illumination should be maintained below 5 lux (Ibrahim *et al*., 2009) and ideally between 2 to 3 lux (Lim, 2009).

The eKasih swiftlet houses were built without a barrier between the bird entrance and the nesting area which allows bright light to enter the nesting area inside the house (Figure 10). Some of the owners take their own initiative by modifying their swiftlet houses either at the bird entrance point by build a box or build a partition inside the house to reduce the sun light entering the nesting area. One house in Pahang, had poor workmanship with gaps between the wall panels that can leak sun light into the house. From recorded data (Figure 7) only 3 of the houses were able to meet the proposed illuminance,while the rest recorded above 5 lux luminance reading.

iv) Area

The Area of the eKasih's swiftlet house that was originally proposed by DVS is a Gable roof design with 16 x10 feet^2 or 4.8 m x 3.0 m, 14.4m^2 (Figure 8 & 9). However, the houses were built with various designs and sizes between 16 x 8 sq feet (11.5m^2) to 16 x 28 sq feet (40.8m^2). The recommended swiftlet houses should provide a roving area around 28 sq metres and this does not include a place for bird nesting bird (Lim, 2009). However, all visited swiftlet houses had an area of less than 28m^2 except one house in Pahang, H9 which is the group swiftlet house.

v) Building material

Another important aspect of housing for swiftlets is the material used to build the house. The materials should have the ability to withstand disasters such as fire,

flood or storm. Fibre cement board is found unsuitable for swiftlet houses in some areas. The swiftlet houses builtd in Perlis were located at coastal areas, which face strong winds and storms especially during the monsoon season. Data from DVS indicate that there were two swiftlet houses completely destroyed by a storm in Perlis (DVS, 2012) and a number of houses where the walls and roof were damaged. It is also not recommended to use fibre cement board as flooring as it is easily damaged or broken and puts the handler or workers in danger.

Another important role played by materials used is to control the internal temperature of the house. The obvious temperature fluctuation throughout the day is not suitable for a swiftlet house; ideally the temperature needs to be maintained throughout the day. To obtain a stable internal temperature, the materials used should have a high ability to store and insulate heat loss. The materials with such ability are usually dense and heavy such as concrete and brick (Ward, 2004), therefore it is recommended to build a swiftlet house using brick and concrete. On the other hand, using double layer walls or adding insulation layers on the wall can be an alternative method to control the internal temperature of the swiftlet house. Some of the visited swiftlet houses have cement board as the outer wall and plywood as the inside wall. There is also an instance during a site visit, whereby the owner wrapped the house wall with black netting as alternative insulation.

vi) Nest production

The three houses that produced bird nest are located in Pahang which are labelled as H9,H10 and H11. However, the bird's nests produced are too dry and brittle. All houses in the various states were exposed to the same weather conditions, but the temperature in these houses in Pahang were lower compared to others. For example, H9 recorded a lower temperature than swiftlet houses in Perlis,al though all the data were taken during sunny condition, except for H11 whereby data was taken at 4 pm when the day's heat had already accumulated inside the house the whole day which contributed to a high temperature. Illuminace recorded in houses in Pahang also are lowest compared to other houses.

However, the correlation of swiftlet nesting with relative humidity is inconclusive in this study as these houses recorded the lowest relative humidity compared to other houses.

vii) Additional observation during the visit

During the visit, all the houses did

not switch on the sound as it was later than 9 o'clock in the morning. Usually the sound is switched on early in the morning between 6am and 9 am and late in the evening between 6 and 7.30 pm. Some of the houses were abandoned by the owner. Therefore, no measurement was taken on how loud the sound was emmitted. Through interviews with owners, all the houses were using only one type of sound for both outside and inside the house. This situation differs with other commercial swiflet houses, whereby different sounds were used for outside and inside the house. One owner in this study, did not use the sound provided by DVS and bought new sounds in order to attract more swiftlets to enter the house. On the other hand, one owner reported that the sound provided scared away the swiflets and she needed to find a different sound in order to attract the birds. The sound provided by DVS are not the same for all swiftlet houses as it depends on the states who use different vendors to prvide these services. This is also the reason behind the various modifications in designs of eKasih swiftlet house although the DVS has provided standard design plan to all states.

In Johor, almost all visited eKasih swiftlet houses have been abandoned by the owners. Through interviews, we concluded that they had given up on this programme because there were no bird's nest being produced, and subsequently they were not willing to bear the continuous cost of maintenance of the facility. Some of the swiftlet houses in palm oil plantation areas were also found to be inhabited by wild bat or owl.

Besides building an ideal environment for swiftlet nesting, accessibility to food is another positive point to ensure the habitat is suitable for swiflet. In Perlis, it was observed that there were many swiftlets flying around the programme area, as the houses were built in an area surrounded by paddy fields. It is believed that, insects from the field have contributed to the good food source for the birds to reproduce.

It was also noted that, there were several big commercial swiftlet houses around eKasih swiftlet house area. These existing commercial swiftlet houses could bethe main competitor to eKasih swiftlet houses. Despite determined efforts by the DVS to sustain this programme ,some eKasih owners have abandoned the houses or used it as a store.

Meanwhile in Pahang, it was found that there are very few or no commercial swiftlet houses operators around eKasih houses.

Furthermore, the houses in Pahang were located in the isolated rural areas surrounded by secondary forests which served as an advantage in terms of feed sources for swiftlets; whereby small insects are plentiful.

Figure 1. One of the swiftlet houses in Johor that uses the Jack Roof design and plywood board as the main material

Figure 2. Another house design in Johor that uses Shed Roof and double layer wall with plywood onthe inside and plaster board on the outside.

Figure 3. A Swiftlet house in Perlis using Gable Roof design and cement board as the wall and floor.

Figure 4. A Swiftlet house in Pahang using Gable Roof design. Cement boards are used for wall and plywood for floor.

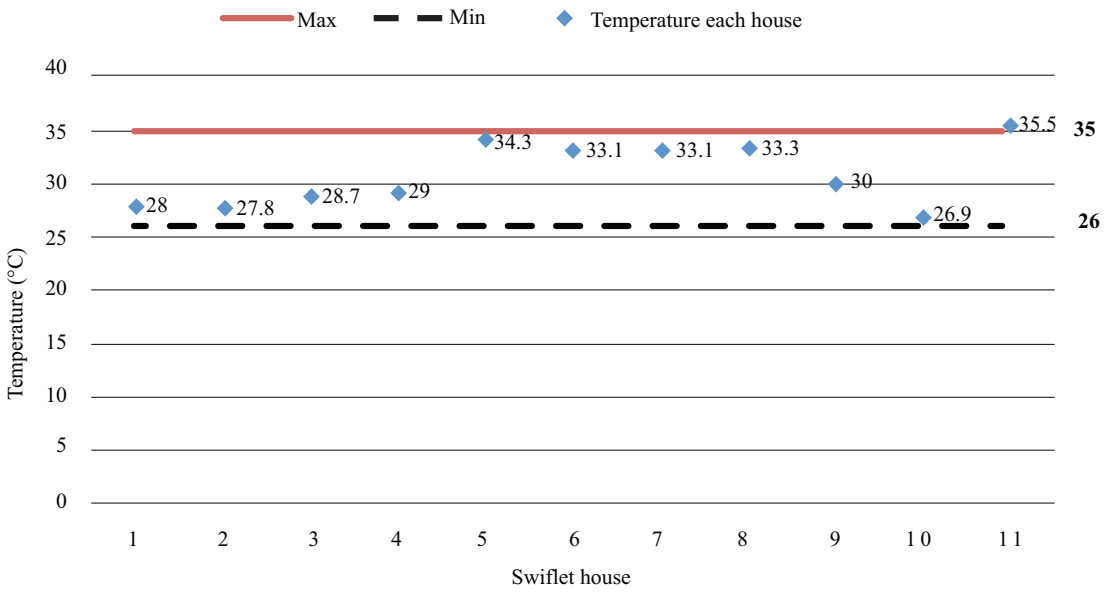

Figure 5. Temperature reading inside swiftlet houses with maximum and minimum recommend temperature.

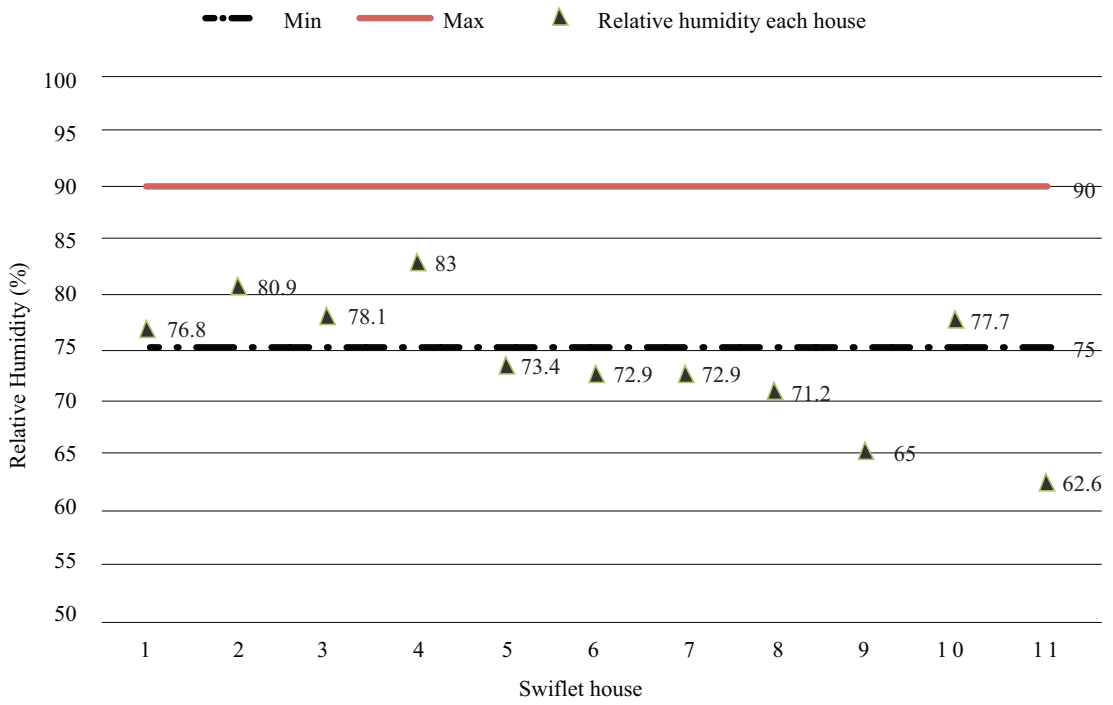

Figure 6. Relative humidity inside swiftlet houses with maximum and minimum recommended relative humidity.

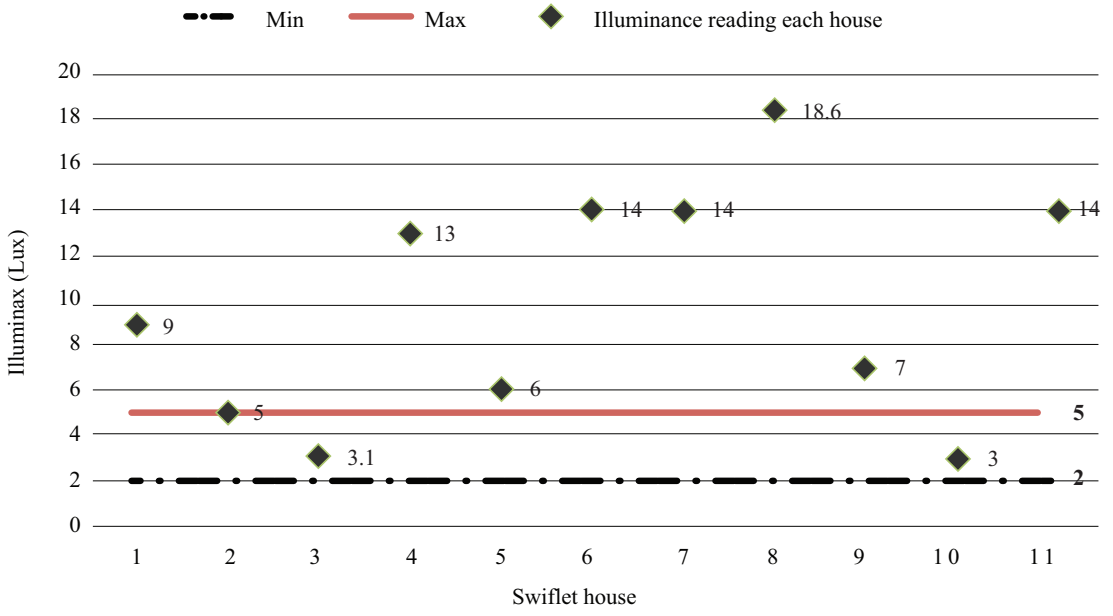

Figure 7. Brightness measurement in swiftlet houses with maximum and minimum recommended illuminax.

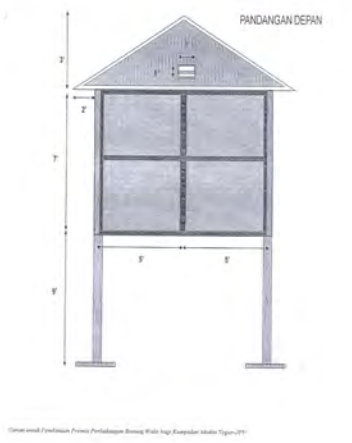

Figure 8. Front view of plan

Figure 9. Side view of plan

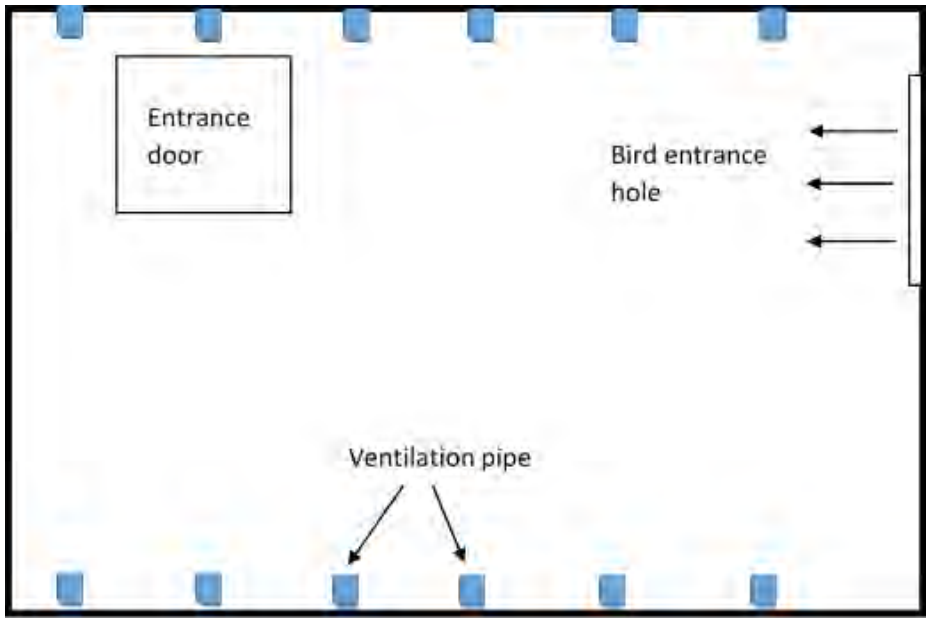

Figure 10. Top view of Floor Plan inside eKasih swiftlet house

CONCLUSION

Most of the visited unsuccessful eKasih swiftlet houses did not meet the recommended conditions. With poor management by the owners, those houses become uninhibited by swiftlets. Due to time restrictions, the number of eKasih swiftlet houses which were monitored and visited too few to provide strong evidence and comparison on the reasons for success or failure. There are various factors that influence the successful outcome of a swiftlet house, further studies should be conducted to determine the most critical factors. Factors such as building structure, design, materials, location and environment inside and outside the house and food source need to be analysed systematically in order to establish critical issues which are needed to ensure the success of swiftlet enterprises for commercial purposes. Other aspects such as presence of competitors within the area and availability of food, quality of sound as an attractant also need to be assessed. Scientific studies on the swiftlet house are still not fully explored, particularly in terms of the internal conditions of the house to attract the birds to inhabit the houses and produce the nests.

Swiftlet industry in Malaysia is considered a new entrepreneurial area, whereby ready data is available from the pioneers who had references from the successful swiftlet farmers or by trial and error in getting the right formula to attract the swiftlet to enter and produce good quality bird nests. In order for the swiftlet industry to grow and be successful, concerted efforts by all parties is needed, and most of all thorough research to give good reliable data to farmers.

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