

# Suitable Ranching Practices in Successful Edible Bird Nest Swiftlet Houses in Terengganu

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**ABSTRACT**--- Majority of edible bird nest (EBN) swiftlet farming industry entrepreneurs suffered losses due to lack of information in suitable ranching practices in EBN swiftlet house. This is because EBN production is influenced by various ranching practices such as EBN swiftlet house types, ranching system, cleaning and maintenance program, guano disposal method, odour program and knowledge on signs of disease that are common in EBN swiftlet. This study compared ranching practices in EBN swiftlet houses in the coastal, rural and urban area in Terengganu to investigate factors that play a critical role in determining the success of a swiftlet ranching venture. This study was conducted from September 2015 until March 2018. Questionnaires were distributed to 246 EBN industry operators; 82 in coastal, rural and urban area in Terengganu respectively. Results showed that for EBN swiftlet houses, single lot buildings were the most preferred (51.63 %), single farming was the most popular ranching system (73.17 %), with almost half (43.9 %) of the EBN entrepreneurs cleaned and maintained their swiftlet house once in three months, 39.84 % of the EBN entrepreneurs collected and composted the guano, majority (76.02 %) of the EBN entrepreneurs did not use odour application to attract EBN swiftlets and most owners (81.3 %) of EBN swiftlet house not familiar with EBN swiftlet disease. There is significant correlation among ranching practices in swiftlet house with location area. Suitable ranching practices were the success factors to ensure high swiftlet population which in term contributes to higher nest production.

**Index Terms:** Edible bird nest production, suitable ranching practices, sustainable management, swiftlet ranching.

## I. INTRODUCTION

Currently, there are 22 species of swiftlets recorded in the world [21]. Swiftlets are of the family Apodidae, and Apodidae refers to a mixed group of small sized swifts [11]. The four most common species of swiftlets found in Malaysia and Borneo are *Aerodramus salangana* (mossy-nest swiftlet), *Aerodramus maximus* (black-nest swiftlet), *Aerodramus fuciphagus* and *Aerodramus inexpectatus* (both

are edible bird nest swiftlet) [4]. According to [11], the shape, positioning and structure of the nest and the composition of materials used are distinctive of each swiftlet species. However, only edible bird nest (EBN) from *Aerodramus fuciphagus* and *Aerodramus inexpectatus* are commercially farmed. Swiftlets roost and nest in caves, often placing their nest in areas of complete darkness and are able to navigate using echolocation [1].

According to [18], the nest of EBN swiftlet constructed entirely from hardened saliva have long been a highly prized delicacy in China. Besides that, the EBN are reputed to have a number of beneficial medicinal properties. Benefits of EBN including helping to dissolve phlegm, improve the voice, relieve gastric problem, aid renal function, enhance complexion, alleviate asthma, suppress coughs, cure tuberculosis, strengthen the immune system, speed recovery from illness and surgery, increase energy and metabolism and improve concentration [9]. According to [7], EBN contain high protein content (59.8 % - 65.4 %), carbohydrates (8.5 % - 16.4 %) and fat (0.01 % - 0.07 %).

According to [6], during the 20th and early 21st centuries, EBN swiftlet ranching in EBN swiftlet house already replaced wild colonies as source of EBN. People of Java have been successfully ranching EBN swiftlets in man-made houses which closely resemble their natural cave habitat for more than a hundred years [12]. According to [12], people have built structures to create a cave like atmosphere, conducive for the birds to build EBN away from caves. These EBN swiftlet houses, as they are often referred to, were first set up close to the coast. However, they can now be found far inland [11]. Nowadays, majority production of the cup-shaped EBN from Indonesia come from EBN swiftlet houses [13]. Besides that, there is a trend of the increasing production of the EBN, following the booming of EBN swiftlet house in Southeast Asia countries especially in Malaysia [22].

According to [18], a variety of management ranching practices were applied to attract EBN swiftlet to roost and nest in EBN swiftlet house. Management ranching practices in EBN swiftlet house including types of EBN swiftlet house, harvesting method, ranching system, guano disposal and treatment, odour control, biosecurity, premise security, pest control program, ability in handling and restraining of injured and sick swiftlets and also abiotic factors. Proper

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management ranching practices in EBN swiftlet houses will ensure high production of EBN [14].

### II. OBJECTIVE

To compare EBN swiftlet ranching management of man-made habitat in EBN swiftlet house in the coastal, rural and urban area in Terengganu.

### III. HYPOTHESIS

H<sub>1</sub>: Suitable EBN swiftlet ranching management practices of man-made habitat in EBN swiftlet house will have a positive effect on the production and quality of the EBN produced and conservation efforts for sustainability.

H<sub>0</sub>: Unsuitable EBN swiftlet ranching management practices of man-made habitat in EBN swiftlet house will have a negative effect on the production and quality of the EBN produced and conservation efforts for sustainability.

### IV. METHODOLOGY

Survey and interviews were conducted with 246 EBN operators namely 82 operators in coastal, rural and urban areas in Terengganu respectively that are registered with the Terengganu Department of Veterinary Services as shown in Table 1. This survey was conducted in 6 months from March 2016 until August 2016.

**Table 1: Number of EBN swiftlet houses registered with the Terengganu Department of Veterinary Services (2016) in each district**

District	Number of Swiftlet Houses
Kuala Terengganu	92
Kuala Nerus	53
Marang	211
Dungun	61
Kemaman	22
Hulu Terengganu	98
Setiu	106
Besut	47
Total	690

Data were divided to three clusters namely north (Besut and Setiu), center (Kuala Terengganu, Kuala Nerus, Marang and Hulu Terengganu) and south (Dungun and Kemaman)

and from that cluster were divided to three location which are coastal, rural and urban area in Terengganu. There are 246 EBN operators namely 82 operators in coastal, rural and urban area in Terengganu respectively that are registered with the Terengganu Department of Veterinary Services were involved in this survey. Fig. 1 shows map for sampling site of EBN swiftlet house operators survey.



**Fig. 1: Sampling site of EBN swiftlet house operators survey**

The survey focused on swiftlet ranching management, with questions based and modified on the Good Farm Practices Scheme of Edible-Nest Swiftlet Premises, and 'Skim Amalan Ladang Ternakan (SALT) untuk Premis Burung Walit' AP/DVS/SALT-W1 (2011) [20].

Questionnaires that were distributed consisted of closed and open-ended questionnaire with 40 questions. Information was obtained on farm profile, land ownership, premise and design, production of bird nest per month (average), water and electricity supply, management and operational control, biosecurity, pest control programme, premise facilities, equipment and maintenance, cleaning and maintenance programs and records, flock health and welfare.

Data was collected as recommended by [10] (Table 2). According to [3], survey research design requires huge sample size for the purpose of representation, in census everyone in the target population is selected to participate in the study. The sample size is equal to the size of the target population, in experimental research design, with treatment and control groups, the sample size may differ in each group. To simplify the process of determining the sample size for a finite population, in [10] came up with a table using sample size for finite population (Table 2).

**Table 2: Determining sample size of a known population [10]**

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367



55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Based on the table of determining sample size of a known population by [10], data on the number of EBN swiftlet houses from the Terengganu Department of Veterinary Services indicates a total of 690 EBN swiftlet houses in Terengganu. This data is near to 700 (population in Table 2). As such, 700 is used as the population and the sample size is 246 for the survey.

A Pearson’s correlation analysis was used to analyse and interpret the data on management ranching practices in EBN swiftlet houses in the coastal, rural and urban area in Terengganu. This analysis was conducted to see the relationship between Edible Bird Nest (EBN) swiftlet house type, ranching system, cleaning and maintenance program, guano disposal method, odour program and knowledge on signs of disease that are common in EBN swiftlets with the location of EBN swiftlet house.

## V. RESULTS AND DISCUSSION

### Types of EBN Swiftlet Houses

In this study, the majority of EBN swiftlet houses comprised of single lot buildings (51.63 %). This was followed by shoplots (26.42 %) and adjoining buildings (14.63 %) while high-rise buildings were the least common (7.32 %) (Table 3). Results of the Pearson’s correlation to determine the relationship between types of EBN swiftlet house with location found a strong positive correlation between types of EBN swiftlet house with the location area ( $r = 0.99$ ,  $N = 246$ ,  $p < 0.001$ ).

**Table 3: Types of EBN swiftlet houses**

Types	Coastal Area (%)	Urban Area (%)	Rural Area (%)	Total (%)
Single lot buildings	50.00	65.85	39.02	51.63
Shoplots	30.49	23.17	25.61	26.42
Adjoining buildings	12.20	7.32	24.39	14.63
High-rise buildings	7.32	3.66	10.98	7.32

According to [14], EBN producers preferred single lot house designs for their swiftlet house as it is easy to control and there will be less disturbance from other activities. Building swiftlet houses in shoplots will also decrease the operation cost. This is since EBN producers do not need to build other buildings as an EBN swiftlet house as they can use the upstairs of their shop as a man-made habitat for swiftlets [19].

In this study, it was also found that some EBN producers built adjoining building as a man-made habitat for swiftlets,

with the second and third floor generally used for swiftlets. On the first floor, they farm fresh water fish species such as tilapia or catfish. The accumulated swiftlets droppings (guano) was also used to feed the fish. Besides that, adjoining building can also refer to the structure of the EBN swiftlet house adjoining with owners’ house which is their home. Hence, owners can control their EBN swiftlet house easily because the EBN swiftlet building is adjoining their home [14].

Additionally, high rise buildings was utilised by EBN producers to decrease cost operation as the EBN producers do not need to rent other buildings to ranch EBN swiftlets because they will use the same building. The top storey of the building is usually used as swiftlet house and the other floors as offices [19].

### Ranching System

Two types of ranching system were recorded as practised by the respondents, namely single ranching system and mixed farming in the survey. Single farming in EBN swiftlet ranching is defined as the ranching system that refers to only EBN swiftlet ranching as the entrepreneurs’ production while mixed farming is defined as the ranching system that refers to several farming types. For example, entrepreneurs practice EBN swiftlet ranching and also farm freshwater fish in the same EBN swiftlet house. In this study, single farming was the most popular system (73.17 %) while only 26.83 % practised mixed farming (Table 4). There was no significant correlation between ranching system of EBN swiftlet house with location area of EBN swiftlet house ( $r = 0.99$ ,  $N = 246$ ,  $p = 0.806$ ).

**Table 4: Ranching system**

Ranching System	Coastal (%)	Urban (%)	Rural (%)	Total (%)
Single ranching	73.17	59.76	86.59	73.17
Mixed farming	26.83	40.24	13.41	26.83

According to survey results, majority of EBN entrepreneurs use single ranching system as they want to focus on one production farming. However, some entrepreneurs use mixed farming ranching system, with second and third floor utilised as swiftlet house while the first floor was usually used to farm freshwater fish such as tilapia and catfish. Some prefer to do this because by providing a pool on the first floor, besides able to farm freshwater fish, owners also can control temperature and

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humidity in their EBN swiftlet house. Besides that, by farming freshwater fish in EBN swiftlet house, owners can get side income by selling the fish. Freshwater fish is also easy to farm because owners do not need to worry about feeding their fish because the accumulated EBN swiftlet droppings (guano) is used to feed the fish [15].

However, based on survey result and discussion with Department of Veterinary Services (DVS), there are have conflict by providing pool on the first floor of EBN swiftlet house. Ministry of Health have issues regarding entrepreneurs who provide pools inside EBN swiftlet house as mosquitoes can reproduce in that pool. To solve this issues, Department of Veterinary Services (DVS) already review on that conflict. If there are mosquitoes in EBN swiftlet house, there will be some of food for EBN swiftlets because they feed on flying insects. Besides that, mosquitoes in pool also can be some of food for freshwater fish that farm in EBN swiftlet house.

*Cleaning and Maintenance Programmes*

Almost half (43.9 %) of the EBN entrepreneurs cleaned and maintained their houses once in three months, 30.49 % did it every two weeks, 16.26 % after every harvest and only 9.35 % once in three weeks. No significant correlation between cleaning and maintenance program of EBN swiftlet house with the locations of EBN swiftlet house ( $r = 0.99$ ,  $N = 246$ ,  $p = 0.441$ ) was recorded. Table 5 shows cleaning and maintenance programmes in EBN swiftlet house as practised by the respondents.

**Table 5: Cleaning and maintenance program**

Cleaning and Maintenance	Coastal (%)	Urban (%)	Rural (%)	Total (%)
Once in three month	52.44	43.9	35.37	43.90
Every two weeks	37.80	23.17	30.49	30.49
After every harvest	7.32	19.51	21.95	16.26
Once in three weeks	2.44	13.41	12.2	9.35

According to the owners of EBN swiftlet houses, cleaning and maintaining their EBN swiftlet house once in three months was the best option as the EBN producers want to cause minimum disturbance in their swiftlet house. According to [17], the swiftlets will be frightened and will stay away if the EBN house is frequently disturbed and visited.

*Guano Disposal Method*

As far as guano disposal was concerned, in 39.84 % of the EBN houses this activity was carried out by collecting and composting the guano. Almost equal percentage of EBN house owners (37.80 %) packed and composted the guano and sell it as their additional revenue whereas 22.36 % only treated and packed the guano (Table 6). There was a strong positive correlation between guano disposal method of EBN swiftlet house with location area of EBN swiftlet house recorded ( $r = 0.99$ ,  $N = 246$ ,  $p < 0.001$ ).

**Table 6: Guano disposal method**

Guano Disposal Method	Coastal (%)	Urban (%)	Rural (%)	Total (%)
Collect and compost	46.34	35.37	37.80	39.84
Pack and compost	43.90	32.93	36.59	37.80
Treat and pack the guano	9.76	31.71	25.61	22.36

Some EBN producers use guano as fertilizer by composting and treating guano to make organic fertilizer. This is used for their own crops or to sell as fertilizer. They also use guano as an odour control to attract swiftlets to enter their EBN swiftlet house. Owners apply methods such as where they blend guano with water then they spray it on nesting planks and walls in their EBN swiftlet house to attract swiftlets [14].

*Odour Program*

Majority (76.02 %) of the EBN entrepreneurs did not use odour as a part of their maintenance programme. Only 23.98 % did implement some form of odour application to attract swiftlets into their houses (Table 7). No significant correlation was recorded between odour program of EBN swiftlet house with location area of EBN swiftlet house ( $r = 0.99$ ,  $N = 246$ ,  $p = 0.07$ ).

**Table 7: Odour program**

Odour Control	Coastal (%)	Urban (%)	Rural (%)	Total (%)
Not use	68.29	74.39	85.37	76.02
Use	31.71	25.61	14.63	23.98

According to [15], some EBN house owners use odour to attract EBN swiftlets. For example, some use swiftlet perfume and guano to attract swiftlets into their EBN swiftlet house. According to [8], newly completed EBN swiftlet house should be sprayed with swiftlet perfume or guano to attract swiftlet into it as swiftlet house that utilise odour will soon be colonized by swiftlets. There are some benefits in using swiftlet perfume as the swiftlet perfume will remove the odour of cement, oil or wood that were used in the construction of swiftlet house. Also, nesting planks that have been sprayed with swiftlet perfume will produce odour very similar to that of the nesting plank used by swiftlets for nesting. The perfume will attract swiftlets to enter and stay on the nesting planks.

*Knowledge on Signs of Disease that are Common in EBN Swiftlets*

The term for residual magnetization is “permanence Most owners (81.3 %) of EBN swiftlet houses had very little knowledge on the signs of common EBN swiftlet diseases and only 18.70 % of them were familiar with some signs of common diseases of EBN swiftlets (Table 8). A strong positive correlation between knowledge on signs of disease that are common in EBN swiftlets of EBN swiftlet house with location area of EBN swiftlet house ( $r = 0.99$ ,  $N = 246$ ,  $p < 0.001$ ) was recorded.



**Table 8: Knowledge on signs of disease that are common in EBN swiftlets**

Knowledge on Sign of Disease	Coastal (%)	Urban (%)	Rural (%)	Total (%)
Very little knowledge on the signs common EBN swiftlet disease	84.15	87.8	71.95	81.3
Familiar with some signs of common disease of EBN swiftlets	15.85	12.2	28.05	18.70

It was found that majority of swiftlet house operators surveyed are not familiar with signs of disease that are common in EBN swiftlet because they do not have knowledge about it. Besides that, they were not involved or joined any courses or workshops organised by Department of Veterinary Services on signs of disease that are common in EBN swiftlets such as basic courses for EBN swiftlet ranching, workshop on EBN processing and courses for renovation of EBN swiftlet house that touch on disease of EBN swiftlet.

Based on survey result, the reason why the respondents not interested to join the courses or workshops because they are have limited commitment on EBN swiftlet ranching because this business as their second job and side income [16]. Entrepreneurs in EBN swiftlet ranching industry actually they are have their main job or main commitment. Hence, they are do not have enough time to join the courses or workshops that clash with their main job schedule.

## VI. CONCLUSION

Productive and profitable entrepreneurs in EBN swiftlet farming suggested to apply ranching practices in their EBN swiftlet house with single lot buildings, single farming, cleaned and maintained their swiftlet house once in three months, collected and composted the guano, use odour application to attract EBN swiftlets and familiar with EBN swiftlet disease. The best way to protect the swiftlet entrepreneurs need the protection of takaful for unpredictable events [2, 5].

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