# PROTEIN CONTENT AND AMINO ACID COMPOSITION OF FARMED EDIBLE BIRD'S NESTS IN MALAYSIA

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## ABSTRACT

This study was conducted to determine and compare the protein content and amino acid composition of farmed edible bird's nest (EBN) obtained from different parts of Malaysia. A total of 115 unprocessed EBN samples from 4 regions; East Coast (Kelantan and Terengganu), Northern region (Perak, Kedah and Penang), Southern region (Johor) and Sabah Sarawak were collected for this study. In this study, protein was analysed using Kjeldahl method while amino acid analysis was performed as described in Waters AccQ Tag Ultra Note with slight modifications using UPLC Aquity H Class Systems with photodiode and fluorescent Aquity detector. Protein analysis indicated that the average protein content of EBN from East Coast, Northern region, Southern region and Sabah Sarawak were 53.6%, 53.8%, 54.3% and 52.8% respectively. The amino acids of EBN comprised of essential amino acids and non essential amino acids.Arginines amounting to 4.0-4.7% (major essential amino acid) and serine amounting to 4.0-5.5% (major non essential amino acid) were the main amino acid constituents. There was no significant difference ($p>0.05$) in protein content while the amino acids content shows a significant different ($p<0.05$) between essential amino acids and non essential amino acids in EBN from 4 regions.In conclusion, this study supported other findings from researchers that EBN was high in protein and non essential amino acid while breeding sites, climate and bird food intake will affect the EBN nutrient composition.

## INTRODUCTION

The edible bird's nest is made from the saliva of swiftlets. Swiftlets (Aves: Apodidae) are insectivorous birds inhabiting mainly limestone caves. They are widespread in the Indian Ocean, South and South East Asia, North Australia and the Pacific Islands and are predominately discovered in Asian countries, such as Malaysia, Indonesia, Thailand, Vietnam, Philippines and China etc. (Marcone, 2005) with Indonesia as the biggest and the Malaysia Borneo provinces of Sarawak and Sabah being the second biggest resource (Hobbs, 2004). Malaysian edible bird's nests come from two species, the White-nest swiflet (*Aerodramus fuciphogus*) and the Black-nest swiflet (*Aerodramus maximus*). The white nest is made almost entirely from saliva (Sims, 1961) while the black nest contains about 10% feathers which contribute 8% of the protein content in the nest (Kang et al., 1991). Since little is not known nor is published about the amino acid composition of these nests in Malaysia, an investigation was conducted to determine and compare the amino acid composition and protein content of EBN obtained from different parts of Malaysia.

## MATERIALS AND METHODS

A total of 155 unprocessed EBN samples from 4 regions of Malaysia; East Coast (Kelantan and Terengganu), Northern region (Perak, Penang and Kedah), Southern region (Johor) and Sabah Sarawak were collected for this study. There were obtained from different parts of each region. All samples were grounded and homogenized using a food grinder prior to further analysis. Protein analysis was performed using Kjeldahl method, using 6.25 as a conversion factor (AOAC method, 2005). The amino acid analysis was performed as described in Waters AccQ Tag Ultra Note with slight modifications. The amino acid profiles was analysed using Waters Aquity H-Class UPLC Systems with photodiode/fluorescent detector. The separation was performed on AccQ Tag Ultra C18 column, 1.7µm (2.1x100mm) with gradient elution of AccQ Tag Ultra Eluent A and B. Total amino acids in EBN were extracted by acid hydrolysis while tryptophan extracted by alkaline hydrolysis. The hydrolysate was subjected to derivatives the amino acids using Waters AccQ Ultra Fluor Reagent. Then, 1µl of derivertized samples were subjected to chromatographic analysis. Statistical analysis was performed using SPSS (Window version 11.5). All results were expressed as mean± standard error of mean (SEM). The data was statistically treated by one way ANOVA and Duncan's post hoc test with $p<0.05$ considered to be statistically significant.

## RESULTS AND DISCUSSION

The findings of this study were shown in table 1. Protein content ranged from 52.8-54.3% from 4 regions. The highest protein level was found in samples from Southern region while the lowest protein content was found in Sabah Sarawak. This result showed not much different compared to Norhayati et al (2010). The amino acid analysis revealed that all regions had similar amino acid profiles that were rich in certain but not all essential amino acid. Sums of essential amino acids ranged between 16.8- 20.0% while sums of non essential amino acids ranged between 20.0-22.8% from 4 regions. Arginines amounting to 4.0-4.7% (major essential amino acid) and serine amounting to 4.0-5.5% (major non essential amino acid) were the main amino acid constituents. There was no significant difference ($p>0.05$) in protein content while the amino acids content shows a significant different ($p<0.05$) between essential amino acids and non essential amino acids in EBN from 4 regions. In conclusion, this study supported other findings from researchers that EBN was high in protein and non essential amino acid while breeding sites, climate and bird food intake will affect the EBN nutrient composition.

Table 1 Protein content and amino composition of EBN in Malaysia

| Parameters (%) | East coast (n= 53) Mean±SEM | Northern region (n=41) Mean±SEM | Southern region (n=30) Mean±SEM | Sabah Sarawak (n=31) Mean±SEM |
|---|---|---|---|---|
| Crude protein | 53.6±0.26$^{a}$ | 53.8±0.18$^{a}$ | 54.3±0.69$^{a}$ | 52.8±1.04$^{a}$ |
| Amino acid | | | | |
| Histidine | 1.6±0.06$^{ab}$ | 1.5±0.05$^{bc}$ | 1.7±0.04$^{a}$ | 1.4±0.04$^{c}$ |
| Arginine | 4.7±0.29$^{a}$ | 4.5±0.27$^{a}$ | 4.0±0.18$^{a}$ | 4.1±0.41$^{a}$ |
| Threonine | 2.8±0.12$^{a}$ | 2.7±0.12$^{ab}$ | 2.2±0.09$^{c}$ | 2.4±0.13$^{bc}$ |
| Valine | 1.9±0.07$^{a}$ | 1.6±0.08$^{b}$ | 1.5±0.12$^{b}$ | 1.4±0.08$^{b}$ |
| Methionine | 0.3±0.06$^{b}$ | 0.7±0.12$^{a}$ | 0.2±0.03$^{b}$ | 0.7±0.16$^{a}$ |

| | | | | |
|---|---|---|---|---|
| Isoleusine | 0.8±0.03[b] | 0.6±0.03[bc] | 1.2±0.12[a] | 0.5±0.03[c] |
| Leusine | 2.9±0.10[a] | 2.7±0.12[ab] | 2.4±0.21[b] | 2.5±0.12[b] |
| Phenylalanine | 2.6±0.09[a] | 2.3±0.10[b] | 2.8±0.09[a] | 2.2±0.10[b] |
| Tryptophan | 0.7±0.03[a] | 0.6±0.03[b] | 0.4±0.01[c] | 0.5±0.04[bc] |
| Lysine | 1.6±0.16[b] | 1.3±0.05[b] | 3.6±0.39[a] | 1.1±0.08[b] |
| *Total essential AA* | 19.9±0.10[b] | 18.5±0.10[bc] | 20.0±0.13[a] | 16.8±0.12[c] |
| Aspartic acid | 3.9±0.13[a] | 4.0±0.13[a] | 3.8±0.13[a] | 3.7±0.11[a] |
| Glutamic acid | 3.0±0.09[a] | 3.0±0.11[a] | 3.0±0.10[a] | 2.6±0.09[b] |
| Serine | 4.7±0.18[b] | 4.3±0.13[bc] | 5.5±0.16[a] | 4.0±0.12[c] |
| Glycine | 1.7±0.10[b] | 1.5±0.11[b] | 2.1±0.06[a] | 1.6±0.14[b] |
| Alanine | 1.3±0.04[a] | 1.3±0.04[a] | 1.3±0.04[a] | 1.2±0.04[a] |
| Proline | 3.4±0.11[a] | 3.2±0.14[ab] | 3.5±0.09[a] | 2.9±0.13[b] |
| Tyrosine | 3.1±0.11[a] | 2.7±0.11[ab] | 2.3±0.24[b] | 2.6±0.10[b] |
| Cystine | 1.1±0.12[b] | 1.1±0.10[b] | 4.1±0.35[a] | 1.4±0.17[b] |
| *Total non essential AA* | 22.2±0.11[a] | 21.1±0.11[ab] | 22.8±0.15[a] | 20.0±0.11[b] |

[abc] means with different superscripts within the same row differ significantly ($p<0.05$), SEM= standard error of mean. AA= amino acid.

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## RESULTS AND DISCUSSION

The results of the study are summarized in Table 1. The average daily dry matter intake ranged between 538 to 547g. There was no significant difference in apparent digestibility of DM, OM, CP, EE, ADF, ADL, NDF and ME among all dietary treatments.

Table 1: Effect of dietary treatments on dry matter intake (g/day) and apparent digestibility (%) of nutritional components in goats

| Item | Diet[1] | | | | P value |
|---|---|---|---|---|---|
| | BCO | BC8 | BC16 | BC24 | |
| Total dry matter intake (g DM /day) | 542.1± 6.66 | 544.3± 3.22 | 538.1± 9.95 | 547.2± 1.55 | p>0.05 |
| Apparent digestibility (%) | | | | | |
| DM | 66.1±1.03 | 66.5±0.68 | 66.3±1.81 | 67.1±1.52 | p>0.05 |
| OM | 67.4±1.08 | 67.7±0.67 | 67.7±1.64 | 68.5±1.52 | p>0.05 |
| CP | 76.5±0.29 | 77.7±0.40 | 76.0±1.45 | 77.1±0.93 | p>0.05 |
| EE | 80.3±1.02 | 83.2±0.59 | 80.6±3.28 | 82.2±1.51 | p>0.05 |
| NDF | 58.3±1.49 | 59.4±1.02 | 58.9±2.34 | 60.8±2.13 | p>0.05 |
| ADF | 42.5±3.02 | 42.3±2.17 | 42.6±3.33 | 38.5±1.90 | p>0.05 |
| ADL | 10.7±0.4 | 9.8±0.31 | 10.5±0.65 | 10.4±0.62 | p>0.05 |
| ME | 66.5±0.98 | 67.1±0.56 | 66.7±1.74 | 67.6±1.47 | p>0.05 |

[1]0% (BCO), 0.8% (BC8), 1.6% (BC16) and 2.4% (BC24) black cumin (BC) seed meal. *Mean ±Standard error.

The similarities in values of digestibility between the control and treatment diets suggest that the addition of the black cumin seed meal up to 2.4% as a source of fatty acid did not affect the rate of degradation or nutrient digestibility in goats. It is possible that addition of the black cumin seed meal as a source of fatty acid preserved the balance of the ruminal microorganisms as suggested by Maia *et al*., 2012.

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