UNIVERSITI TEKNOLOGI MARA
Cawangan Kedah
Kampus Sungai Petani

Faculty of Administrative
Science and Policy Studies

# i-SPiKE 2021

*Leading An Artificial Innovation In Knowledge, Education And Design*

## i-SPiKE 2021
## INTERNATIONAL EXHIBITION & SYMPOSIUM

# E-PROCEEDINGS

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# BUNNY'S PELLET: NATURAL MULBERRY PELLET

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**ABSTRACT**
Rabbit farming is a thriving industry in Malaysia. Normally in rabbit production farm, farmers use commercial pellet as the main diet of the rabbits and feed is the main expense as it accounts for between 70 to 80% of animal production. In fact, the prices of commercial pellet in recent years have increased, making the rabbit farming more expensive. Mulberry (*Morus* spp) is one of the legumes that is highly palatable and digestible to herbivorous and monogastric animals. Crude protein in mulberry leaves can go up to 18.9 to 21.9%. Mulberry leaves have a good potential to replace the concentrate inthe rabbit feed and can be used as the main feed for rabbits. However, the rabbits tend to pick all the high sugar and low fibre bits only from the fresh hay or green leave. Hence, in the current study, mulberry leave with other ingredients were processed into uniform pellets for a balanced nutrient source; called Bunny's pellets. This Bunny's pellet can be a new replacement of commercial pellet as it contains similar nutritional values as a commercial pellet. The benefits of Bunny's pellet include high crude protein, nutritional values similar to the imported commercial pellet, low cost compared to commercial pellet as well as no artificial colour and preservatives. The product was tested in a 60-day rabbit feeding trial using 15 New Zealand White cross California rabbits. The findings demonstrated that the Bunny's pellets are high in terms of digestibility and palatability, good feed intake, thus promoting a satisfactory weight gain in rabbits. The average daily gain and feed conversion ratio of the results were

not significantly different between control (commercial pellet) and mulberry pellet. A few industries and university that we worked with closely on the development of this Bunny's pellets are Persatuan Penternak Arnab Pedaging (APEK), Taman Arnab IQ, Bumi Barakah Agro Enterprise and Universiti Malaysia Terengganu. This product has been published in two undergraduate theses, a book chapter, and a journal article (in review). This product was previously awarded a Silver medal in UMK Carnival of Research & Innovation 2019.

**Keywords:** pellet, mulberry leave, rabbit, rabbit feed, growth performance

## INTRODUCTION

In the context of the livestock industry in Malaysia, it is well known that ruminant animal is slow in growth and in reproduction and need a large area to provide forages. Poultry is the biggest producer of meat at present. However, the feed cost is the biggest constraint in poultry production. China has started to reduce the use of cereal for poultry and swine, hence the rabbit production has more opportunities to develop. In such situation, rabbit, with its high production potential, seems to fit in as another source of meat for human consumption.

In rabbit production farm, farmers normally use commercial pellet as the main diet of the rabbits. Rabbits commonly eat dried forage such as hay as the staple diet item. In animal farming, feed is the main expense as it accounts for between 70 and 80% of animal production. In fact, the prices of commercial pellet in recent years have increased making the rabbit farming more expensive.

Mulberry (*Morus* spp) is one of the legumes that is highly palatable and digestible to herbivorousand monogastric animals. Crude protein in mulberry leaves can up to 18.9 to 21.9% (Yao et al., 2000). Bamikole *et al*. (2005) reported that the mulberry leaves can replace 50% of the commercial pellet in the rabbit's diet. Mulberry leave has a good potential to replace the concentrate in the rabbit feed and can be used as a main feed for rabbits. However, the rabbits tend to pick all the high sugar and low fibre bits only from the fresh hay or green leave. Hence, in the current study, mulberry leave with other ingredients was processed into uniform pellets for a balanced nutrient source. Pelleting is very easy and convenient to operate. In addition, pelleting reduces farmers' transportation, handling, and storage costs of forages or fresh vegetables. Research on the use of mulberry pellet in feeding rabbits has been limited. Therefore, this current study aimed to evaluate the effect of mulberry leaf pellet on the growth performance of rabbits as well as to determine the feed conversion ratio of the rabbit following the feeding of mulberry leaf pellet.

## MATERIALS AND METHODS

### Chemical analysis

The commercial pellet, mulberry leaf pellet (Figure 1) and fresh mulberry leaf were analysed for dry matter (DM), ash, crude fibre (CF) and crude protein (CP) (AOAC, 1997) contents. Ether extract (EE) was determined by Foss Extraction system (Foss, Gerhardt, Germany) by extraction with petroleum ether. Organic matter (OM) was calculated from 100-ash.

Experimental design

At the start of the experiment, fifteen (15) New Zealand White cross California rabbits were randomly assigned into 3 treatment groups (n=5). Group 1 (control) was the control group fed on a normal diet, which were 100% commercial pellet. Group 2 (T1) was fed 75% of mulberry leaf pellet and 25% of commercial pellet, Group 3 (T2) with 50% of mulberry leaf pellet and 50% of commercial pellet. All animals were also given fresh Napier grass for supplementation and munching. For the treatment groups, the mulberry leaf pellet and commercial pellet were mixed before feeding them to the rabbits. The duration of feeding trial was 60 days excluding the adaptation periods. The experimental site was at Rabbit House, Agro Techno Park in Universiti Malaysia Kelantan, Jeli Campus.

Evaluation of feed intake, body weight gain and feed conversion ratio

The feeds were weighed and fed to the rabbits every morning and evening. Each rabbit was served different amounts of feed based on their body weight and calculated with dry matter (DM). The leftover of the next meal was weighed using digital balance. In order to calculate the feed intake of the rabbit, the leftover of the feed was subtracted with the total amount of feed. The amount of feed was increased as the age increased. The weight of rabbits was weighed twice a week. The individual rabbit was weighed using a weighing scale. The weight of the rabbits was recorded inside a logbook which acts as record keeping book. The feed conversion ratio was calculated to determine the measurement proportion of the effectiveness of the rabbits' bodies in changing the feed into nutrient. The feed conversion ratio was calculated by dividing the feed given over the animal's weight gain.

Statistical analysis

All the data of the experiment was calculated using One-Way analysis of variance (ANOVA) by IBM SPSS statistic. Differences between the least squared means were considered to be significant at $p<0.05$ and Tukey's test was employed to elucidate significant differences.

## RESULTS AND DISCUSSION

Chemical composition of feed

Based on the proximate analysis in Table 1, Mulberry leaf pellet had the highest dry matter content (%), which was 91.07% ± 0.10 compared to commercial pellet and mulberry leaf. However, in terms of crude protein content (%), Mulberry leaf contained 24.10% ± 0.32 which was the highest among the feed samples, followed by Mulberry leaf pellet (19.43% ± 0.08) and commercial pellet (17.20% ± 0.16). Next, Mulberry leaf contained higher crude fibre content (41.55%) than commercial pellet and Mulberry leaf pellet which were 18% and 8.17% respectively. But ether extract (EE) and ash content (%) of the Mulberry leaf pellet were the highest compared to commercial pellet and Mulberry leaf. The commercial pellet contained 2.24% ± 0.04 of EE and 10.84% ± 0.37 of ash content whereas Mulberry leaf contained 1.58% ± 0.05 of EE and ash content of 10.15% ± 0.09 respectively. The result from proximate analysis indicates that both mulberry pellet and commercial pellet contain higher dry matter content as well as lower in moisture content compared to mulberry leaf. Nowadays, most rabbit pellets sold commercially are nutritionally complete with the correct balance protein, fibre, fat, vitamin and mineral.

Growth performance of rabbits and feed conversion ratio

Based on Table 2, there is no significant difference of average daily gain (ADG) in control, T1 and T2 groups. The total feed intake for 60 days for control, T1 and T2 are 143.06±1.83, 132.77±5.15 and 140.85±4.82, respectively (Table 2). The daily feed intake was not significantly affected by the diet ($p \geq 0.05$). The feed intakes recorded in all dietary treatments were close to 149.9 g/day (Gidenne et al., 2009), but higher than 78.7g/day (Baba, 2003) and 53.3-60.4 g/day (Mohammed et al., 2011). It was suggested that Mulberry leaf pellet had high digestibility and palatability, similar to the commercial pellet. This finding is in agreement with Kandylis et al. (2009), who reported that Mulberry leaf also had high digestibility and palatability. Bamikole, et al., (2005) also reported that mulberry leaves can support good feed intake, digestibility and thus promote a satisfactory weight gain in rabbits.

Table 2 also shows the feed conversion ratio (FCR) of all groups. There was a significant difference ($p \leq 0.05$) between treatments on FCR which were at 6.65, 8.37 and 6.89 for CD, T1 and T2 respectively. It was shown that T1 was significantly higher than CD and T2, while for CD and T2 there were no significant differences. A possible explanation for the finding may be the similar crude protein content in CD and T2 diets, as these nutrients play significant roles in growth and reproduction in animals.

**Table 1.** Proximate composition (%) of mulberry leaf, mulberry leaf pellet and commercial pellet.

| Constituents (%) | Mulberry leaf | Mulberry leaf pellet | Commercial pellet |
|---|---|---|---|
| Dry matter | 33.97 ± 1.06 | 91.07 ± 0.10 | 89.43 ± 0.04 |
| Moisture | 66.02 ± 1.07 | 8.92 ± 0.10 | 10.57 ± 0.04 |
| Crude protein | 24.10 ± 0.32 | 19.43 ± 0.08 | 17.20 ± 0.16 |
| Crude fibre | 41.55±8.90 | 8.17±0.12 | 18.00±1.35 |
| Ether extract | 1.58 ± 0.05 | 5.98 ± 0.04 | 2.24 ± 0.04 |
| Ash content | 10.15 ± 0.09 | 10.96 ± 0.02 | 10.84 ± 0.37 |

**Table 2.** Average daily body weight changes (g/d) between groups (Mean±SE)

| Parameters | Control | Treatment 1 | Treatment 2 |
|---|---|---|---|
| Average daily weight gain (g) | 17.33±1.60 | 13.33±1.36 | 16.08±1.22 |
| Total feed intake | 143.06±1.83 | 132.77±5.15 | 140.85±4.82 |
| FCR | $6.65 \pm 0.53^{a}$ | $10.37 \pm 1.34^{b}$ | $6.89 \pm 1.13^{a}$ |

Control: the control group fed with based on normal diet (100% commercial pellet); Treatment 1: the animals were fed 75% of mulberry leaf pellet and 25% of commercial pellet; Treatment 2: the animals were fed 50% of mulberry leaf pellet and 50% of commercial pellet.

**Figure 1.** Mulberry leaf pellet

## CONCLUSION

The use of 50% mulberry leaf pellet as substitute for commercial pellet in rabbit rations, has no adverse effects on growth and carcass characteristics of the animals. Similarly, the FCR was also not affected by the mulberry leaf pellet as compared to the commercial pellet. It is recommended that 50% mulberry leaf pellet could be used successfully to replace commercial pellet in rabbit rations.

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