Effect of Pellet Size in Ration with or without *Indigofera* sp on New Zealand White Rabbit Performances

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Abstract. Rabbit is an alternative animal raised by the farmer for profit. Therefore, the ration used varied and tended to use commercial pelleted feed. The current study was intended to evaluate effect of pellet size of rabbit ration with or without *Indigofera* sp on the performances of rabbit. Seventy-two rabbits of one month old were used allocated to 12 experimental units. The main factor was ration types (with or without inclusion of *Indigofera* sp) and the second factor was pellet size (S, M and L). The experiment was arranged in Completely Nested Randomized Design. The results showed that feed consumption was not significantly influenced by the type of ration and pellet size. In addition, type of ration significantly (P>0.05) influenced the body weight gain and highly significantly (P>0.01) influenced on feed conversion. Economic calculation based on Income Over Feed Cost (IOFC) indicated ration containing *Indigofera* was highly significantly (P>0.01). In conclusion, ration containing *Indigofera* sp at long size of pellet improves performance of New Zealand White Rabbit.

1. Introduction

Development of rabbit is usually related to tourist destination areas, because of easiness to market. Places like Batu and Bandung are among famous tourist destination areas of which rabbits are sold. In the high altitude, rabbit is usually grow better. New Zealand rabbit is the most common rabbit raised by farmer, beside Flemish Giant, Rex, Angora, Chinchilla etc. In addition, selling rabbit in the tourist area is usually much more expensive so that it would be more profitable for farmer.

The required nutrients for rabbit are set in the table of nutrient requirement. It contains list of nutrients needed, for example protein, digestible/metabolizable energy, and fiber are among important nutrient have to be fulfilled. Rabbit is a pseudoruminant animal, needs a substantial amount of forages as cheap fiber source. For practical purpose, rabbit might be fed complete feed, usually in the form of pellet. Feeding complete feed in the form of pellet could overcome problem of preference, so that rabbit could not select more preferable feed ingredient. Previous research indicated that pelleted feed in more preferable than mash form of feed in rabbit, but the average daily gain did not differ when pellet feeds of 2.1 and 6.5 cm were fed [1].

Therefore, generally farmer uses pellet to supplement the use of forages. Inexpensive forages are usually used ranging from common grass, vegetable wastes like water spinach, carrot leaf, cabbage etc. Sometime, only limited amount of pellet is used and consequently could not meet protein requirement.
As a result, performance of rabbit is usually also low. Alternatively, with movement of planting legume surrounding house, attempt is made to incorporate *Indigofera* sp leaf to rabbit pelleted feed. This plant is known to grow well during dry season, at high forage production mass. Nutrient contents of *Indigofera* sp leaf were crude protein 28.98%, crude fat 3.30%, crude fiber 8.49%, calcium 0.52% and phosphorus content was 0.34% [2;3]. Thus, the authors [4] reported that *Indigofera* sp could substitute soybean meal in layer chicken.

The matter is form of feed also important consideration for rabbit, particularly related to pellet size or length. This research aims to evaluate the effect of feed with and without *Indigofera* sp when rabbit fed pellet with different length.

2. Material and method

2.1. Material

Materials used in this research were 72 New Zealand White rabbit of 1 month old. Basal feed was formulated from several ingredients, namely yellow corn, rice bran, pollard, soybean meal, groundnut peel, corn cob, molasses and premix. The composition and nutrient contents of basal feed with and without *Indigofera* sp as shown in Table 1.

| Feed ingredient | Without *Indigofera* (%) | With *Indigofera* (%) |
|------------------|--------------------------|-----------------------|
| Yellow Corn      | 22                       | 22                    |
| Rice Bran        | 16                       | 16                    |
| Pollard          | 26                       | 13                    |
| Coconut meal     | 5                        | 5                     |
| Groundnut peel   | 10                       | 10                    |
| Corn cob         | 5                        | 5                     |
| Soybean meal     | 14                       | 7                     |
| *Indigofera* sp leaf | 0                     | 20                    |
| Premix           | 0.02                     | 0.02                  |
| Molasses         | 1.98                     | 1.98                  |

Nutritional Content *

| Dry Matter (%) | 87.2 | 89.0 |
| Organic Matter (%) | 93.8 | 91.1 |
| Crude Protein (%) | 16.98 | 16.53 |
| Crude Fiber (%) | 15.46 | 18.46 |
| Crude Fat (%) | 3.82 | 3.25 |

2.2. Method

Method used was field experiment, based on Nested Completely Randomized Design of which having main factor of basal feed with or without *Indigofera* sp and sub-treatments were three different sizes of pellet, namely small (0.6 cm length), medium (1.2 cm length) and long (1.8 cm length). Thus, it can also be described as follow:

- **P1** = Without Indigofera: size Small
- **P2** = Without Indigofera: size Medium
- **P3** = Without Indigofera: size Long
- **P4** = With Indigofera 20%: size Small
- **P5** = With Indigofera 20%: size Medium
- **P6** = With Indigofera 20%: size Long

Variables measured were feed consumption, feed conversion and Income Over Feed Cost (IOFC)
2.3. Analysis data
Data were analyzed by using ANOVA of Nested Completely Randomized Design. If significant effect occur then it would be tested by Duncan Multiple Range Test.

3. Result and discussion
3.1. Feed consumption
The present results indicated that preference feed consumed was in favor of *Indigofera* sp containing feed, though not statistically significant. Previous results [5] showed that *Indigofera* was the second after *Arachis pintoi* as among the 10 legumes tested for palatability.

| Pellet size | Type of feed | Without *Indigofera* | With *Indigofera* |
|-------------|--------------|-----------------------|-------------------|
| S           |              | 3541 ± 100.05         | 3617 ± 97.60      |
| M           |              | 3645 ± 149.48         | 3611 ± 121.75     |
| L           |              | 3531 ± 183.65         | 3692 ± 210.33     |
| Total       |              | 3573 ± 149.81         | 3640 ± 147.68     |

The results showed that pellet size/length did not significantly influence feed consumption in rabbit, in addition basal feed containing either with or without *Indigofera* sp also did not significantly influence feed consumption. However, *Indigofera* sp containing feed tended to be more palatable regardless the pellet size. The fiber content in *Indigofera* sp might contribute to shorten retention time, leading to increase excreted indigested nutrient in the feces. Consequently, gastric emptying is faster and consumption increased [6].

3.2. Body weight gain
The results showed that pellet size did not significantly affect body weight gain, but regardless of pellet size inclusion of *Indigofera* sp in the basal feed significantly improved or increased (P<0.05) body weight gain. Previous author [1] said that between pellet size of 2.1 cm and 6.5 cm indicated no different in average daily gain of rabbit. Current research indicated that even smaller different in sizes (0.6, 1.2 and 1.8 cm) did not show different feed consumption and body weight gain in rabbit.

| Pellet size | Type of feed | Without *Indigofera* | With *Indigofera* |
|-------------|--------------|-----------------------|-------------------|
| S           |              | 971 ± 37.24           | 1039 ± 47.2       |
| M           |              | 1024 ± 54.23          | 1038 ± 40.42      |
| L           |              | 995 ± 73.13           | 1061 ± 39.74      |
| Total       |              | 997 ± 57.88           | 1046 ± 41.53      |

Note: different superscript in the same raw indicated significant different (P<0.05)

In addition, the inclusion of *Indigofera* sp showed significantly higher in body weight gain than control group without containing *Indigofera* sp. Though, in term of nutrient contents of both feeds did not show significant in protein content, current higher daily weight gain might reflect protein in *Indigofera* sp containing feed might be easier to be digested, leading to be more weight was deposited in rabbit.

3.3. Feed conversion
Feed conversion ratio is obtained by divided feed consumption and body weight. The current results indicated that though pellet size did not influence feed conversion, the inclusion of *Indigofera* sp highly statistically significant different (P<0.01) or improved feed conversion in rabbit. Since, publication on
the use of *Indigofera* sp in rabbit is still limited its prospective use as protein source in rabbit feed is promising.

**Table 4.** Feed conversion as affected by pellet size in rabbit basal feed with or without *Indigofera* sp

| Pellet size | Without *Indigofera* | With *Indigofera* |
|-------------|----------------------|------------------|
| S           | 3.67 ± 0.18          | 3.49 ± 0.23      |
| M           | 3.56 ± 0.12          | 3.48 ±0.19       |
| L           | 3.70 ± 0.25          | 3.54 ± 0.20      |
| Total       | 3.64 ± 0.19<sup>b</sup> | 3.50 ± 0.20<sup>a</sup> |

Note: different superscript in the same raw indicated highly significant different (P<0.01)

### 3.4. Income over feed cost

Income over feed cost is a simple calculation in attempt to predict income based on the different between revenue from selling rabbit and cost for buying feed. Sometime the calculation result is not significant but the different result indicates a significant amount of money. In that way, statistical result might be not improtant anymore. The result indicated that among pellet sizes there was no significant different, though the long pellet size tended to produce highest IOFC, but the IOFC was highly significantly higher (P<0.01) in Indigofera sp inclusion in feed.

**Table 5.** Income over feed cost (IOFC) as affected by pellet size in rabbit basal feed with or without *Indigofera* sp (IDR/tail/6 weeks)

| Pellet size | Without *Indigofera* | With *Indigofera* |
|-------------|----------------------|------------------|
| S           | 20383 ± 1339         | 23173 ± 1897     |
| M           | 21967 ± 1447         | 22932 ± 1819     |
| L           | 20801 ± 2359         | 23317 ± 1689     |
| Total       | 21050 ± 1804<sup>a</sup> | 23141 ± 1701<sup>b</sup> |

Note: different superscript in the same raw indicated significant different (P<0.01)

### 4. Conclusion

It is concluded that pellet size (small, medium, long) did not significantly change rabbit performances, however, type of feed (with inclusion of *Indigofera*) significantly improve rabbit performances. It is suggested that rabbit feed should include *Indigofera* to get better performance, preferably with long pellet size.

### References

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