The feed consumption of Deer \((Axis\ axis)\) fed three difference type of feedstuffs

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Abstract. Spotted deer \((Axis\ axis)\) is one of the animals that are currently being developed as source of animal protein for people in Indonesia. A spotted deer breeding center can be successfully developed by providing feed with a good quality and having enough nutrient. The main purpose of this study was to determine the feed organic matter consumption of a group of 36 deer fed carrot, feed concentrate, and elephant grass. Feeding of the three feedstuffs was carried out for three weeks with different feedstuffs each week. In the first week of experiment, a group of 36 deer was given carrot (Diet-1), the second week the deer was given feed concentrate (Diet-2), and the third week the deer was given elephant grass (Diet-3). Water was freely available to the deer every day. The consumption of feed organic matter and the feed palatability were measured 5 days each week, then the deer was given 2 days’ adaption period for new feed. Data of organic matter consumption of feed the analyzed using a one-way analysis of variance (Anova). The results showed that the organic matter feed consumption was significantly difference \((p<0.05)\) between those of the three difference feedstuffs. Those 21 deer consumed organic matter of carrot 12kg/day, feed concentrate 13kg/day, and elephant grass 4kg/day, respectively. A similar trial was conducted to a group of 9 deer, and the results of this trial just confirmed the results of the previous experiment. It was concluded that the different of organic matter consumption of the three feedstuffs may be due to difference of the palatability of the feedstuffs.

1. Introduction

The principal nutrient need for growing deer are carbohydrate, protein, fat, minerals, vitamins, and water. The Rack Buck Deer Management Inc stated that the organic matter makeup of deer during the growing stage is almost entirely protein. Even after mineralization (hardening) is complete, a good portion of protein remains in these deer. To grow the best set of deer that his genetics and age will allow, a deer needs feed containing at least 16% to 18% digestible crude protein. Not all proteins are digestible to the deer. The most important factor in growing deer is to provide the feed with nutrient rich during the growth period. Calcium is another element needed by deer during and after the antler growth period. Although a deer can take calcium from bones in other parts of body and utilize it for antler growth, deer still needs feed that contain a minimum of 0.45% calcium. Phosphorus is also needed for antler growth. Although dietary phosphorus requirements are not completely known, it is believed that the lowest level a deer needs for adequate antler growth and other body functions is 0.30%. Vitamin D is important in promoting calcium absorption and mineralization of bone. A deer gets all the Vitamin D they need by absorbing ultraviolet light through its skin and eating vegetation that has been in direct
sunlight. Vitamin A is important to antler development once the bone hardening begins. Carotenes in green leaves can be converted to Vitamin A. Green leaves can become scarce during the rainy months, but remain an important part of the deer’s diet [1,2]. When we started working to find a way to grow semi endanger spotted deer at the ‘Deer breeding center Hasanuddin University’ [3], we did not have much information which nutrients were needed nor the amount of each. We just knew we needed to improve the natural vegetation on the properties we were working on. It only made sense because all the spotted deer were found in areas where the soil was rich [4]. The nutrient-rich soil grew nutrient-rich vegetation. The deer ate this nutrient-rich vegetation and grew big bodies and big antlers. We assumed all we had to do was to fertilize the vegetation that the deer were feeding on.

It is clear that the deer at the breeding center need a proper nutrient levels in the natural vegetation, for the deer herd to feed on, in order the deer to be properly developed. Therefore a research finding the correct nutrient combination still need to be investigated. The main aim of this experiment was to investigate the feed organic matter consumption of deer fed three difference types of feedstuffs, namely carrots, feed concentrate, and elephant grass.

2. Materials and method
This research was conducted at the Deer breeding center Hasanuddin University on June to July 2019. The feed chemical analysis was done at the laboratory of Kimia Pakan Faculty of Animal Science Hasanuddin University. A group of 21 deer studied consists of 6 mature males (bucks), 7 mature females (does), and 8 young deer (fawn) of 6 months’ age. The group of 21 deer was fed carrots (diet 1) in the first week, the they fed feed concentrate (diet 2) in the second week, and in the third week they fed elephant grass (diet 3). The deer was given 2 days’ adaptation period each week. The feed organic matter intake was measured during 5 days each week by weighing the feed offered and the feed residue every day. Data of organic matter intake of 3 diets treatment with 5 replications were analyzed using a one-way analysis of variance [5] followed by Duncan’s test to examine the significant differences between the diets.

3. Result and discussion
A proximate chemical analysis [19] was conducted to measure the chemical feed nutrient of the three feedstuffs studied. The result of the chemical analysis is shown in Table 1.

| Nutrient (%) | Carrots (diet-1) | Feed concentrate (diet-2) | Elephant grass (diet-3) |
|--------------|------------------|--------------------------|------------------------|
| Dry matter   | 83               | 93                       | 95                     |
| Crude protein| 13               | 15                       | 9                      |
| Crude fat    | 2                | 3                        | 3                      |
| Crude fiber  | 8                | 23                       | 36                     |
| Ash          | 5                | 13                       | 15                     |
| Organic matter| 95             | 87                       | 85                     |

Source: Laboratory of Kimia Pakan, Hasanuddin University (2019).

Table 1 indicated that organic matter content of feed concentrates relatively similar with that of elephant grass, but relatively lower compared to that of Carrots. In contrast the crude fibre content of carrots was relatively lower compared to that of feed concentrate and elephant grass. The crude protein content of elephant grass was relatively lower than that of carrots and feed concentrate. The crude fat content was quite similar between the three feedstuffs. Surprisingly the results of these feed chemical analysis by laboratory at Hasanuddin university are similar compared to that of feed chemical analysis done by three difference researchers [6-8], at three difference laboratories (see tabel 2).
Table 2. Chemical composition of Carrots, feed concentrate, and elephant grass.

| Nutrient          | Carrots | Feed concentrate | Elephant grass |
|-------------------|---------|------------------|----------------|
| Dry matter        | 11.71   | 14.70            | 19.90          |
| Crude Protein     | 9.30    | 29.01            | 10.20          |
| Crude Fat         | 2.40    | 2.77             | 1.60           |
| Crude fiber       | 2.80    | 23.10            | 34.20          |
| Ash               | -       | 19.06            | 11.70          |
| Organic matter    | -       | 80.94            | 88.30          |

Sources: [6-8].

In this experiment, these three types of feedstuffs were fed to a group of 21 deer studied consists of 6 mature male deer, 7 mature female deer, and 8 young deer of 6 months’ age. The deer were reared semi intensively in about 1 HA areas with some trees planted which very useful for protected the deer from heat or cold stress [9]. The feedstuffs offered were placed in an open box which enable us to measure the amount of feed offered and feed residue every day. Water was offered freely to the deer and it available any time. The result of the experiment is shown in table 3.

Table 3. Feed organic matter intake of deer fed carrots, feed concentrate, and elephant grass.

| Feed intakes                  | Carrots                | Feed concentrate                  | Elephant grass               |
|-------------------------------|------------------------|-----------------------------------|-------------------------------|
| Organic matter (kg/21head/d)  | 12.68±0.93ab           | 13.16±0.54ab                      | 4.01±1.15ab                  |
| Nitrogen free extract (kg/21head/d) | 9.52±0.70ab         | 6.82±0.28ab                      | 1.71±0.49ab                  |
| As fed (kg/21head/3h)         | 34.8±8.92ab           | 5.1±0.39ab                       | 14.35±6.48ab                 |
| Dry matter (kg/21head/3h)     | 3.48±0.89ab           | 2.50±0.18ab                      | 1.75±0.79ab                  |

Note: Difference superscripts in the same row indicated significantly different (P<0.05).

Table 3 indicated that the deer consumed less dry matter, organic matter, and nitrogen free extract from elephant grass then that from carrots and feed concentrate. When we measured the feed consumed within 3 hours period of time, we found that carrots and elephant grass was more palatable compared to that of feed concentrate. This feed preference [2,10,11,18], might be due to the feeding track record of the deer along time period before the deer were used at this experiment. As matter of fact that the deer were used to be given a large portion of carrots in their diet. It seems likely that the deer need more time adaptation period (2 weeks) to consumed feed concentrate and elephant grass which were considered to be a new feedstuff offered. The fact that carrot was found to be more palatable too this explain why carrots was consumed more by deer than feed concentrate [12]. Although the elephant grass was found to be more palatable too but it found that the deer take longer time to finish eating the elephant grass offered. This might be due to the chemical structure of the grass which rich fiber and low protein content. In addition, the volume and the rumen capacity of the deer cause the limitation of the elephant grass intakes by the deer. The deer rumen capacity might be having already full when they consumed elephant grass, but the deer was still need nutrient intake to match their nutrient need for maintenance and production [13].

The deer consumed nitrogen free extract from elephant grass which found to be the lowest intake compared to that of carrots and feed concentrate. This mainly due to the fact that the elephant grass contains very low organic matter mainly low protein, but very high in fiber content probably high in lignocellulose content which is difficult to be digested by the deer [14,15]. The low nitrogen free extract intake of the elephant grass was also caused by palatability [12,16], and it also the fact that the deer consumed more carrots and feed concentrate (table 3). The lower nitrogen free extract content of the grass the lower the organic matter content and the lower nutritive value of the feedstuffs will be [17].

4. Conclusion
It is concluded that the deer consumed organic matter more in carrots and feed concentrate compared to that of elephant grass. The higher and the lower organic matter intake might be due to feed preference,
the feed palatability, and the nitrogen free extract content of the feedstuffs studied. Some other factors such as rumen volume and capacity, live weight, and the age of the deer seem likely to be involved in influencing the results of this experiment.

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