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Vegetable Waste as Wafer Feed for Increasing Productivity of Sheep

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ABSTRACT

Vegetable waste is part from vegetables or vegetables that are not used or discarded in the market. The weakness of this vegetable waste is easy to decay, voluminous (bulky) and the availability was fluctuated, so the processing technology is needed to make this vegetable waste to be durable, easy to stored and easy to given to the animal. To solve this problem is making vegetable waste into wafer feed. The aim of this experiment was to determine the productivity of sheeps that were given by vegetable waste as wafer feed. Experimental design used randomized block design with 5 treatments and 3 replications. The treatments were wafer feed composition i.e R1 (100% of conventional feed), R2 (75% of conventional feed+25% of wafer feed), R3 (50% of conventional feed+50% of wafer feed), R4 (25% of conventional feed+75% of wafer feed), R5 (100% of wafer feed). Conventional feed were field grass and rice bran. The results of this research indicated that the treatments had not significant effect ($p>0.05$) on productivity of sheep. Sheep were fed by conventional fed had final body weight 27.07 kg, meanwhile sheep were fed 100% of wafer feed complete had 34 kg or 25.6% higher than conventional.

Key words: Vegetable waste, wafer feed, productivity, sheep

INTRODUCTION

Animal productivity is low due to the low quality feed relating to the availability of forage, especially during the dry season, so that should be pursued alternative forage easily obtainable, cheap and available. As it is known that forage productivity is seasonal. During the rainy season, forage is abundant, but during the dry season forage very little or none so that sheep can decrease productivity.

Sheep farms rely heavily on forage productivity that determine the success of the farm. To solve this problems need to look for alternative feed forage in the dry season. Vegetable waste when it is used as a raw material has several advantages that have economic value because it can produce a variety of useful products and easily obtainable, cheap and available, also can reduce the problem of environmental pollution caused by waste. The weakness of this vegetable waste is easy to decay, voluminous (bulky) and the availability was fluctuated, so the processing technology is needed to make this vegetable waste to be durable, easy to stored and easy to given to the animal. To solve this problem is making vegetable waste into wafer feed. A pressing technology can make feed product into a wafer form. The wafer feed must contain energy; mineral; vitamin and protein needed by animal to increase productivity (Retnani *et al*., 2010a).

MATERIALS AND METHODS

The experiment used 15 heads of thin tail sheep with average initial body weight around 25.15±6.18 kg. The experimental sheep were maintained individually. The ration used consisted of two types conventional feed (field grass and rice bran) and wafer feed. Nutrient composition of wafer feed during processing (% Dry Mater) are presented on Table 1. Figure 1 showed that diagram process of wafer feed production by chopping, drying, mixing, preasing, heating and forming with temperature 100°C for 10 min to get wafer feed and than cooling in room temperature.

Experimental design: The experimental design used in this research was a randomized block design with five treatments and three replications, the treatments were wafer feed of vegetable waste production composition i.e: R1 (100% of conventional feed), R2 (75% of conventional feed+25% of wafer feed, R3 (50% of conventional feed+50% wafer feed), R4 (25% of conventional feed+75% of wafer feed), R5 (100% of wafer feed). Conventional feed were field grass and rice bran. The data was analyzed with the analysis of variance and the differences among treatments were examined with orthogonal contrast test (Steel and Torrie, 1993). The parameters measured were productivity of sheep, i.e. daily weight gain, body weight and IOFC.

The variables that would be measured were:

- Daily weight gain was calculated by:

$$\text{Dailyweight gain (g/head/day)} = \frac{\text{Final body weight gain (g)} - \text{Initial body weight gain (g)}}{\text{During theresearch (days)}}$$

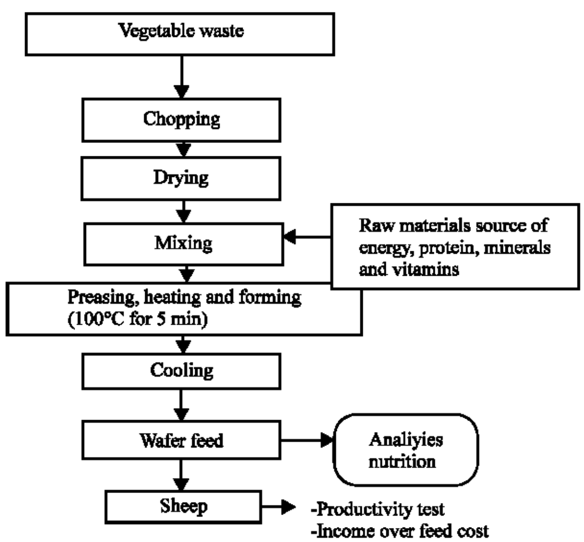

Fig. 1: Diagram process of wafer feed production

Table 1: Nutrient composition of wafer feed during processing (% dry mater)

Wafer feed	Water content	Ash	Crude protein	Crude fiber	Crude fat	NFE
Before processing	13.03	8.84	20.81	37.02	4.09	29.23
After processing	8.68	7.99	20.32	36.30	3.12	32.26

- Body weight was calculated by body weight sheep were weighed every 2 weeks during maintenance
- Feed efficiency was calculated from Income over Feed Cost (IOFC). IOFC that calculates the difference between sheep sales revenue minus feed cost incurred during the maintenance process

RESULTS AND DISCUSSION

Physical form of wafer feed was a cube with size 5×5×5 cm^3. The texture of wafer feed was rough with coarse particle size. During process making wafer feed by heating and pressing did not a decline in nutritional quality. Table 1 about nutrient content wafer feed (% dry matter) was shown that nutrition quality of wafer feed almost same with nutrition quality before process. Wafer feed of vegetable waste had nutrient content there are 7.99% of ash, 20.32% of crude protein, 36.30% of crude fiber, 3.12% crude fat 32.26% of NFE and had physical characteristic 11.71% of moisture content, 96.02 of water absorption, 0.81 of water activity and 0.97 of density. In this study, used conventional feed. Conventional feed were rice bran and field grass. Nutrient composition of rice bran and field grass (% Dry Mater) are presented on Table 2.

The result showed that wafer feed treatment did not significant ($p>0.05$) on daily weight gain of sheep. However, feeding treatment was significant effect ($p<0.05$) on block of daily weight gain. It was mean, wafer feed given to the sheep that have a low body weight produced higher daily weight gain (139 g/head/day) compared with the other treatments. Daily weight gain of the sheep during research (8 weeks) (g/head/day) was shown on Table 3. Sheep that have a low body weight more responsive on feeding treatment, because the sheep require higher nutrition to grow and thrive. Wafer feed have higher protein (20.32%) compared with nutrient content of conventional feed (% dry matter). Daily weight gain in this study ranged from 37.78-151.11 g/head/day. The treatment of R5 (100% of wafer feed) was highest daily weight

Table 2: Nutrient composition of rice bran and field grass (% dry mater)

Ingredient	Water content	Ash	Crude protein	Crude fiber	Crude fat	NFE	GE
Rice bran	8.11	7.99	14.53	12.48	8.47	56.53	4087
Field grass	19.63	14.62	18.08	28.32	2.04	36.94	741

Table 3: Daily weight gain of the sheep during research (8 weeks) (g/head/day)

	Block			
Treatment	B1	B2	B3	Average
R1	76.67	3.33	33.33	37.78±36.87
R2	186.67	113.33	60.00	120.00±98.34
R3	50.00	193.33	80.00	107.78±76.69
R4	133.33	50.00	56.67	80.00±63.59
R5	246.67	156.67	50.00	151.11±34.05
Average	139±80.16	103±77.28	56±16.89	

R1: 100% of conventional feed, R2: 75% of conventional feed+25% of wafer feed, R3: 50% of conventional feed+50% wafer feed, R4: 25% of conventional feed+75% of wafer feed, R5: 100% of wafer feed, B1: Small body weight block, B2: Medium body weight block, B3: Big body weight

Table 4: Average body weight of the sheep during research (8 weeks) (kg head^{-1})

	Weeks				
Treatment	0	2	4	6	8
R1	24.80±7.46	24.07±7.08	25.00±7.41	25.60±6.66	27.07±6.87
R2	25.67±6.08	27.13±5.11	27.87±5.68	31.20±5.69	32.87±6.36
R3	25.60±6.66	27.33±5.11	26.67±5.35	31.07±4.09	32.07±3.75
R4	24.73±7.23	25.77±5.21	25.60±4.50	29.00±5.25	29.53±4.91
R5	24.93±8.73	27.23±7.52	29.60±7.25	33.47±7.27	34.00±8.63
Block					
B1	18.80±1.83^{a}	21.08±3.86^{a}	22.12±5.60^{a}	26.36±5.37^{a}	27.12±5.81^{a}
B2	24.00±2.51^{b}	25.92±5.17^{b}	27.04±4.69^{b}	29.40±6.26^{b}	30.20±6.57^{b}
B3	32.64±1.16^{c}	32.64±0.99^{c}	31.68±1.29^{c}	34.44±1.19^{c}	36.00±1.46^{c}

R1: 100% of conventional feed, R2: 75% of conventional feed+25% of wafer feed, R3: 50% of conventional feed+50% wafer feed, R4: 25% of conventional feed+75% of wafer feed, R5: 100% of wafer feed, B1: Small body weight block, B2: Medium body weight block, B3: Big body weight, Values with different letters in block part indicate significant difference at $p<0.05$

gain than with other treatments. According to NRC (1985), daily weight gain was influenced by several factors, i.e. the total consumption of protein, sex, age, genetic, environmental, physiological condition of livestock and management.

The results of the daily weight gain in this study was lower than other studies by Retnani *et al.* (2010b) that examined the productivity of sheep with market vegetable waste wafer with average daily weight gain of 110.71-126.98 g/head/day. However, daily weight gain in this study is higher than the research study Rianto *et al.* (2006) that examined the productivity of sheep forage and concentrates *ad libitum* to get the daily weight gain of 44 g/head/day. Results are not much different from Arifin *et al.* (2006) in a research giving *Pennisetum purpureum* and feed supplement to cattle sheep results daily weight gain of 40.62 g/head/day. Martawidjaja (1985) states that the daily weight gain of sheep without concentrates and only consume grass averaged 18 g/head/day, while the provision of concentrate 71 g/head/day, an increase of 294%.

The result showed that wafer feed treatment did not significant ($p>0.05$) on average body weight of sheep. However, feeding treatment was significant effect ($p<0.05$) on block of body weight. Treatment of R5 (100% wafer feed) have average body weight of the highest compared to the other treatments. The average body weight of the sheep during research (8 weeks) was shown on Table 4. Sheep were fed by conventional fed had final body weight 27.07 kg, meanwhile sheep were fed 100% of wafer feed complete had 34 kg or 25.6% higher than conventional. According Purbowarti *et al.* (2005), body weight thin tail sheep can reach 30-40 kg in males.

Income is one of the main objectives in farm. By knowing the amount of income received by then a farmer can determine if feed costs incurred during the maintenance of livestock or not economical enough. IOFC (Income Over Feed Cost) that calculates the difference between sheep sales revenue minus feed cost incurred during the maintenance process.

The amount of benefits obtained by calculating the value of the business efficiency is the difference between sheep sales revenue minus feed cost incurred during the process of maintenance. Income over feed cost of the sheep during research (rupiahs) shown on Table 5.

Table 5: Income over feed cost of the sheep during research (Rupiahs)

Treatment	Selling price/sheep	Purchase price/sheep	Feed cost	IOFC
R1	1.055.800	967.200	78.500	10.100
R2	1.282.000	1.001.200	116.700	164.100
R3	1.250.800	998.400	95.600	156.800
R4	1.151.700	964.500	155.800	31.400
R5	1.326.000	972.300	207.650	146.050

Table 5 showed that IOFC were Rp.10.100 (R1), Rp.164.100 (R2), Rp.156.800 (R3), Rp.31.400 (R4), Rp. 146.050 (R5). The highest income over feed cost feed of sheep fed with 25% of wafer feed was Rp. 164.100.

CONCLUSION

Sheep were fed by conventional fed had final body weight 27.07 kg, meanwhile sheep were fed 100% of wafer feed complete had 34 kg or 25.6% higher than conventional. The highest income over feed cost feed of sheep fed with 25% of wafer feed.

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