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Digestibility of Dry Matter and Organic Matter in Feed with Pollard Substitution in Male Jawarandu Goats

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ABSTRACT. This study aimed to determine the effect of adding pollard to the feed on the digestibility of dry matter and organic matter in Jawarandu goats, as well as to assess the impact of pollard supplementation on the productivity of these goats. The study was conducted from March 2020 to May 2020. The material used in the study consisted of male Jawarandu goats, aged approximately 1 year, with an average body weight of 20.74 kg (CV= 13.60%), placed in individual metabolic cages with a stage cage model, totaling 12 Jawarandu goats. The feed used consisted of forage, specifically elephant grass, and concentrate, comprising rice bran, cassava flour, and pollard, with a ratio of 30% forage to 70% concentrate. This study employed an experimental, quantitative method with a completely randomized design (CRD), involving four treatments. The results showed that the effect of adding pollard to the ration on dry matter and organic digestibility in male Jawarandu goats was not significantly different (P>0.05). However, the best treatment in this study was treatment P3 with a pollard addition ratio of 60%, yielding a daily body weight gain of 89.63 g/head/day, dry matter digestibility of 47.51±11.55%, and organic matter digestibility of 55.67±11.30% in male Jawarandu goats. The addition of pollard to the feed of Jawarandu goats tends to increase the value of dry matter digestibility, organic matter digestibility, and increase the productivity of Jawarandu goats.

Keywords: Goat, digestibility, dry matter, organic matter

INTRODUCTION

The increasing population growth from year to year has an impact on the level of public demand for animal protein. The Beef and Buffalo Self-Sufficiency Program, launched by the government in 2004, has yet to show results. One of the measures to meet the demand for animal protein is the intensification of goat farming. In Indonesia, goat farming plays an important role for farmers, as supported by data showing that the goat population in Indonesia continues to increase every year. According to (BPS, 2023) the goat population in East Java has increased significantly by 529,862 heads or 15.74% from 2017 (3,367,323 heads) to 2022 (3,897,185 heads). Goat farming has high potential and productivity for producing meat and milk (dual-purpose), and their skin also has economic value (Riswandi and Muslima, 2019).

According to Purbowati et al. (2015), Jawarandu goats are the result of crossbreeding between Kacang goats and Peranakan Etawah goats, so their Etawah genotype is relatively low and their Kacang genotype is relatively high (more than 50%). Adult male Jawarandu goats weigh around 21-40 kg and have thick fur on their hind legs (Mardhianna et al., 2015). A part from livestock, another thing that must be considered in animal farms is feed that has sufficient nutritional content for the livestock.

Feed is one of the key factors that must be considered in increasing the productivity of livestock. According to Arora (1995), feed consumption is a fundamental factor that determines the nutrient level, function, and response of animals, as well as the utilization of nutrients in feed. According to Sarwono and Mulyono (2004), the amount of feed required by goats depends heavily on their body weight and ability to consume feed (acceptability). Feed consumption is greatly influenced by the digestibility of the nutrients it contains and is affected by the amount and content of nutrients consumed by livestock (Umar et al., 2015). Mustabi et al. (2020) stated that high digestibility reflects the large contribution of certain nutrients to livestock, while feed with low digestibility indicates that the feed is less able to supply nutrients for basic life and livestock production purposes. The level of feed digestibility indicates the extent to which the feed contains nutrients in a form that can be digested in the digestive tract.

Digestibility can be used as a means of determining feed value. Digestibility is also important for determining the extent to which nutrients contained in feed can be absorbed for basic life functions, growth, and production (Hutabarat et al., 2015). Feed digestibility is a series of physical and chemical changes that feed undergoes in the digestive tract (Aryanto et al., 2013). Furthermore, it is written that digestibility can be used as a means of determining feed value, and is also important for determining how much of the nutrients contained in feed can be absorbed for

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basic life, growth, and production. Hanum and Usman (2011) argue that dry matter digestibility needs to be observed because dry matter reflects the nutritional quality of feed; low dry matter digestibility indicates low nutritional quality. Therefore, it is possible to manipulate feed while maintaining good production. Based on this description, it is necessary to research the effect of adding pollard to feed on the dry matter digestibility and organic matter digestibility in male Jawarandu goats.

MATERIALS AND METHODS

This research method uses an experimental quantitative method. This study was conducted by feeding pollard, rice bran, and cassava flour as feed ingredients in concentrates given to male Jawarandu goats to determine the dry matter digestibility and organic matter digestibility of Jawarandu goat feed.

This study was conducted using a completely randomized design (CRD) with four treatments and three replicates (4×3). The treatments used in this study were the provision of forage in the form of elephant grass and concentrate consisting of rice bran and cassava flour, with the addition of pollard as a differentiator in each treatment. The details of the treatments to be carried out are as follows:

P0 = forage (30%) + 70% concentrate (rice bran 80% and cassava flour 20%)
P1 = forage (30%) + 70% concentrate (rice bran 64%, cassava flour 16%, and pollard 20%)
P2 = forage (30%) + 70% concentrate (48% rice bran, 12% cassava flour, and 40% pollard)
P3 = forage (30%) + 70% concentrate (32% rice bran, 8% cassava flour, and 60% pollard)

Feed was given at 4% dry matter in accordance with the instructions from Kearl (1982), based on the body weight of each animal, with a balance between forage and concentrate of 30%:70 %. The goats were placed in individual metabolic pens equipped with feeding and drinking troughs. The model or type of pen used in this study was a platform pen with partitions to separate the goats from each other. The goats were placed randomly according to the number of samples to be studied, namely 12 male Jawarandu goats.

This study used 12 (twelve) male Jawarandu goats with an age range of ± 1 year and an average body weight of 20.74 kg (CV= 13.60%) placed in metabolic pens with a platform pen model. The feed used in this study consisted of forage and concentrate. The forage used was Elephant Grass (*Pennisetum purpureum)* with a cutting age of around 40-45 days. The concentrate was a basal feed consisting of a mixture of rice bran and cassava flour with a ratio of 80%:20% (as basal concentrate). The treatment was differentiated in terms of concentrate composition, namely by adding pollard to each treatment with different percentages, namely 20% (P1), 40% (P2), and 60% (P3), and P0 as the control (without added pollard). The analysis used SPSS for Windows version 16.

Table 1. Feed ingredient composition and nutrient content of feeds with different pollard substitutions in Jawarandu goats

Feed Ingredients	Treatment			
	P0	P1	P2	P3
	------- (% Total Feed) -------			
Elephant grass	30	30.0	30	30
Concentrate	70.0	70.0	70.0	70.0
Pollard	0	20	40	60
Rice bran	80	64	48	32
Cassava flour	20	16	12	8
Nutrient Content Concentrate (%) *				
Dry Matter	91.88	90.95	90.82	89.99
	------- in 100% Dry Matter -------			
Crude protein	8.56	9.01	8.86	8.74
Crude fiber	13.83	10.04	9.52	9.03
Crude fat	9.10	9.60	9.58	9.56
Energy (kcal/100g)	363.85	364.10	368.05	365.80
Ash	1.78	1.76	1.76	1.75
Carbohydrates	58.60	60.11	61.05	60.90

Description: *) Results of Analysis by the Biotechnology Laboratory, Faculty of Animal Husbandry, Hasanuddin University, Makassar

RESULTS AND DISCUSSION

Consumption of Dry Matter and Organic Matter

The results of statistical analysis (Table 2) show that the addition of pollard as a concentrate feed mixture did not produce significant differences (P>0.05) in dry matter (DM) consumption, organic matter (OM), and daily weight gain of Jawarandu goats compared to the control group. DM consumption in this study ranged from 673 to 783 g/head/day (3–3.5% DM of body weight) with body weights ranging from 20 to 25 kg. Kearl (1982) stated that dry matter intake for goats weighing 20–25 kg ranged from 540 to 640 g/day. The level of dry matter intake in livestock is greatly influenced by feed palatability, making it an important factor that affects the level of dry matter consumption.

Several studies indicate that pollard has a metabolizable energy of 1140 kcal/kg, protein

14.77%, and ash 5.49% (Umar et al., 2015), fiber 11.2%, and fat 3%. According to Cheeke (1998), in addition to feed quality, quantity also affects the daily weight gain of Jawarandu goats. Pollard as an energy source can increase nutrient consumption (Umar et al., 2015). According to Rianto et al. (2006), the addition of pollard can increase the supply of nutrients for livestock, which is reflected in daily weight gain. Daily weight gain showed no significant difference (P>0.05) with the control, due to the large standard deviation, but treatment P3 (60% pollard) tended to produce higher weight gain than the other three treatments, reaching 89.63±65.71 g/head/day. According to the results of a study (Purbowati et al., 2015), the daily weight gain of adult male Jawarandu goats reached 42.30 g/head/day. According to several researchers, differences in weight gain among individual goats can be caused by the feed provided (Syuhada et al., 2009; Martawidjaja et al., 1999). Pollard is an energy-rich feed source with high nutrient content and high digestibility (Sanan, 2018).

Table 2. Dry matter and organic matter intake of feeds with different pollard substitutions in Jawarandu goats

Variable	Treatment			
	P0	P1	P2	P3
DM consumption (g/day)				
Total	783.79 ±195.46^{ns}	673.73 ±36.52^{ns}	721.16 ±275.89^{ns}	779.82 ±320.54^{ns}
Forage	414.26±42.27^{ns}	359.99±93.37^{ns}	359.95±94.22^{ns}	400.60±68.63^{ns}
Concentrate	369.53±153.51^{ns}	313.74±27.72^{ns}	361.21±186.90^{ns}	379.21±256.14^{ns}
DM Consumption (%BW)				
Total	3.41±0.51^{ns}	2.99±1.15^{ns}	3.29±0.68^{ns}	3.38±0.97^{ns}
Forage	1.82±0.02^{ns}	1.64±0.18^{ns}	1.66±0.18^{ns}	1.76±0.08^{ns}
Concentrate	1.59±0.51^{ns}	1.35±0.98^{ns}	1.63±0.56^{ns}	1.61±0.89^{ns}
OM consumption (g/day)				
Total	483.20±153.51^{ns}	410.39±276.01^{ns}	452.25±198.27^{ns}	479.92±249.17^{ns}
Forage	150.25±15.33^{ns}	130.57±33.87^{ns}	130.55±34.18^{ns}	145.30±24.89^{ns}
Concentrate	332.94±138.31^{ns}	279.82±243.24^{ns}	321.70±166.46^{ns}	334.62±226.02^{ns}
OM Consumption (%BW)				
Total	2.09 ±0.46^{ns}	1.80±0.94^{ns}	2.05±0.54^{ns}	2.06±0.82^{ns}
Forage	0.66±0.01^{ns}	0.59±0.06^{ns}	0.60±0.06^{ns}	0.64±0.03^{ns}
Concentrate	1.43±0.46^{ns}	1.21±0.88^{ns}	1.45±0.50^{ns}	1.42±0.79^{ns}
ADG (g)	43.70±34.02^{ns}	51.85±48.96^{ns}	64.44±58.42^{ns}	89.63±65.71^{ns}

Description: ^{ns} is not significantly different

Statistical analysis shows that organic material consumption did not show a significant difference (P>0.05), although organic material consumption in the P0 treatment tended to be higher (reaching 483.20±153.51 g/head/day) or 2.09±0.46% of body weight compared to the other three treatments. This indicates a close relationship between dry matter consumption and organic matter consumption, but the ADG achieved (P0) was at the lowest level. The results of this study show that organic matter consumption is directly proportional to dry matter consumption. If dry matter consumption is high, organic matter consumption will also be high (Mustabi et al., 2020). According to Rianto et al. (2006), adding pollard to feed increases the crude protein content of the feed, and consequently, crude protein consumption also increases. This suggests that adding pollard to feed can enhance goat productivity (Umar et al., 2022).

Dry matter and organic matter digestibility of feed and FCR in Table 3, The digestibility value of dry feed in this study showed no significant difference (P>0.05). Feed intake affected the dry matter digestibility (DMD) in each treatment, with no significant difference (P>0.05). Therefore, lower digestible intake may affect ADG (P>0.05). The digestibility of rations can be influenced by feed ingredient composition, feed nutrient composition, dry matter intake, digestion rate, physical form of feed, and the ratio of feed nutrients in the ration. The digestibility values were not different in this study, presumably because feed ingredients, processing, storage, and feeding techniques were not differentiated. This is in accordance with the opinion Arora (1995), which states that the flow rate of digesta is caused by uniformity of consumption and feed palatability. Furthermore, digesta flow rate is defined as the time required to eliminate 5–80% of undigested feed particles in the feces. Dry matter digestibility (DMD) is calculated as the amount of feed consumed minus the feces excreted. High dry matter digestibility indicates that the feed provided is of good quality, whereas low feed digestibility indicates that the quality of the feed provided is poor (Sutrisno et al., 2022).

Table 3. Dry matter and organic matter digestibility of feed and FCR with different pollard substitutions in jawarandu goats

Variable	Treatment			
	P0	P1	P2	P3
DM release				
Feces (g/day)	272.80±210.35^{ns}	208.62±136.87^{ns}	228.63±44.71^{ns}	384.49±228.52^{ns}
Feces (% body weight)	1.15±0.78^{ns}	0.92± 0.04^{ns}	1.08±0.01^{ns}	1.65± 0.07^{ns}
Digestible DM (g)	510.99±53.73^{ns}	465.10±231.40^{ns}	492.53±268.00^{ns}	395.32±117.45^{ns}
Digestibility of DM (%)	67.99±17.40^{ns}	69.98±6.53^{ns}	65.83±12.60 ^{ns}	52.49±11.55^{ns}
FCR DM	20.66±17.15^{ns}	13.16±5.62^{ns}	21.79±22.23 ^{ns}	12.50 ±9.58^{ns}
OM release				
Feces (g/day)	187.89±142.00^{ns}	147.83±99.22^{ns}	156.44±30.05^{ns}	273.22±168.22^{ns}
Feces (% body weight)	0.79±0.53^{ns}	0.65±0.34^{ns}	0.74±0.19^{ns}	1.17±0.59^{ns}
Digestible OM (g)	295.31±33.71^{ns}	262.56±178.78^{ns}	295.82±192.89^{ns}	206.69±92.82^{ns}
OM digestibility (%)	35.50±16.40^{ns}	36.19±6.35^{ns}	38.07±14.58^{ns}	55.67±11.30^{ns}

Description: ^{ns} is not significantly different

The Effect of Pollard Addition on Weight Gain

The results showed that adding pollard to the concentrate feed mixture did not produce any significant difference (P>0.05) in the daily weight gain of Jawarandu goats. According to Cheeke (1998), in addition to feed quality, quantity also affects the daily weight gain of Jawarandu goats. The addition of pollard as a concentrate in this study was expected to improve feed quality so that consumption could be optimized. According to Umar et al. (2015), the nutrient composition of pollard is as follows: crude protein reaches 14.77% and ash 5.49%. Based on the above research results, the addition of pollard in this study was expected to affect the daily weight gain of Jawarandu goats. Table 4 shows the variation in initial and final body weight and ADG from the study. The initial and final body weights in this study did not show significant differences (P>0.05). This condition affected the daily weight gain, which also did not show significant differences (P>0.05).

Table 4. Weight gain of Jawarandu goats with different pollard substitutions in Jawarandu pollard goat feed on dry matter digestibility

Body Weight	Treatment			
	P0	P1	P2	P3
Initial (kg)	21.77±2.99^{ns}	20.60±2.51^{ns}	20.00±4.58^{ns}	20.60±2.25^{ns}
End (kg)	23.73±1.62^{ns}	22.93±4.06^{ns}	22.90±2.74^{ns}	24.63±3.91^{ns}
ADG (g)	43.70±34.02^{ns}	51.85±48.96^{ns}	64.44±58.42^{ns}	89.63±65.71^{ns}

Description: ns is not significantly different

The daily weight gain in Table 4 above shows no significant difference (P>0.05), but treatment P3 tends to provide higher daily weight gain compared to the other three treatments. This indicates that treatment P3 has a higher pollard balance (60%) in the concentrate mixture compared to the other treatments. The daily weight gain in P3 reached 89.63±65.71 g/head/day. According to Purbowati et al. (2015), the daily weight gain of adult male Jawarandu goats reached 42.30 g/head/day in the same goat breed. The results of a study Rianto et al. (2006) conducted on thin-tailed sheep fed 1% of their body weight in pollard yielded an ADG of 68.51 g/head/day. Based on the results of these two studies, this study yielded a better ADG with the feeding of 1% of body weight in pollard.

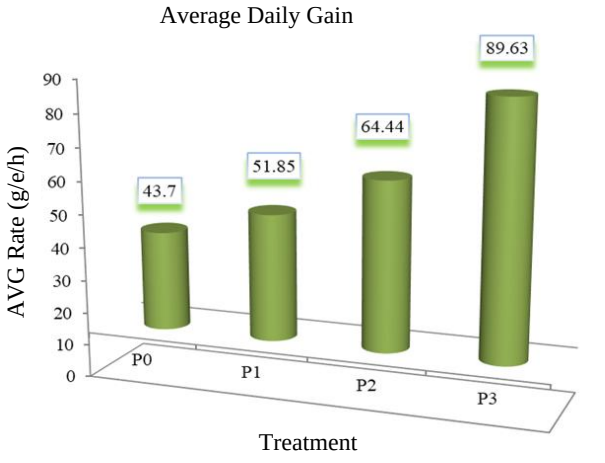

Figure 1. Diagram of daily weight gain of Jawarandu goats with pollard addition

The results of the study shown in Figure 1 provide an overview of the effect of adding pollard. Differences in daily weight gain among individual

goats may be due to the feed provided. Kearl (1982) states that dry matter intake for goats weighing 20-25 kg ranges from 540-640 g/day. The above description shows that the addition of pollard can increase the daily weight gain of Jawarandu goats. The higher the pollard intake, the higher the weight gain.

CONCLUSION

The study concludes that incorporating pollard into the feed of Jawarandu goats does not influence the digestibility of dry matter and organic matter, nor does it affect weight gain.

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