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The Performance of Kacang Goats Using Feed Waste Corncob and Sago Pulp Has Been Improved in Quality

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Abstract: *Goats have high adaptability to grow and develop normally even though they are raised extensively, but feed will greatly determine production and productivity so that animal feed is needed that can substitute the nutritional value of forage feed that is easily obtained at low prices does not compete with humans and nutritional value can affect livestock production. This study aims to examine the response of ammonia and fermented feed to feed consumption, weight gain, body temperature, digestibility of dry matter and organic matter of male Kacang goats. This research was conducted in the experimental enclosure of Tuweley Village, Tolitoli Regency, Central Sulawesi for 4 months, the materials used in this study were male Kacang goats aged 8 to 11 months, fermented-ammoniated corncob feed (Amofer), fermented sago pulp, mini king grass forage and gliricidia leaves. Using a single-factor complete randomized design with 4 treatment levels of 5 repeats. First treatment (F1) 70% Forage + 15% Corncob concentrate + 15% Sago pulp Concentrate, 2nd treatment (F2) 70% Forage, + 20% Corncob concentrate + 10% fermented sago pulp concentrate, third treatment (F3) 70% forage + 10% Corncob concentrate + 20% Sago pulp concentrate. All forage material is chopped before being given to Experimental livestock. The collected data were analyzed using variety analysis, then influential observations were further tested using honest real difference tests. The results showed that the treatment did not significantly affect feed consumption, significantly affected the increase in body weight, body temperature, digestibility of dry matter and organic matter.*

Keywords: *Ammonia and Fermentation, Goat, Feed, Production*

I. INTRODUCTION

In addition to management, livestock production is also determined by feed (Ginting *et al.*, 2018), its availability must be fulfilled continuously, quality, and as needed. Changing the function of both converted land to agricultural and industrial land has an impact on reducing land for animal feed both for large and small ruminants, land for animal feed is not fertile and marginal (Syadik *et al*., 2022). To maintain the availability of feed, efforts to find alternative animal feed, especially for goats, need to be done. The obstacle for farmers in

providing feed is the limited number of feed sources, in addition to low nutritional quality and the nature of choosing feed by livestock, especially goats, causing the feed available in the field to be insufficient for goats.

To maintain the availability of feed, especially during the dry season, it is necessary to strive for feed with sufficient nutrition, can be stored for a long time, affordable in its manufacture, the basic ingredients are available enough around the farmer's area so that the nutritional intake of feed in livestock remains guaranteed. One alternative to providing cheap and competitive feed is through the utilization of waste, both agricultural waste, livestock waste and industrial waste, (Pranata dan Chuzaemi 2020). Such as corncob and sago pulp.

Corncob and sago pulp have the potential to be used as animal feed, because they contain high crude fiber and low digestibility (Tala dan Irfan, 2018), However, its utilization also has a limiting factor because it contains high lignin, agricultural waste on average contains cellulose and hemicellulose bound to lignin and forms lignocellulose and lignohemicellulose bonds that cannot be digested by rumen microbes (Tilman 1991), This inability is due to the formation of hydrogen bonds on the critical side that limit the activity of cellulose enzymes, for that technology is needed to stretch or break the bonds between lingnin and cellulose and hemicellulose. One technology that is easy to do is fermentation (Krisnaingsih dan Susanto, 2017), which causes changes in the composition and structure of cell walls that play a role in freeing lignin and cellulose bonds as well as chemical treatments that can reduce crude fiber and at the same time increase the digestibility of fibrous feed ingredients (Syadik, *et al*., 2022). Therefore, a study was conducted to examine the "Effect of fermented ammoniated corncob and fermented sago pulp on local kacang goat performance.

II. Research Methods

This research was carried out in the experimental cage from January to March 2022, Gunung Cengkeh street, No. 57, Tuweley Village, Tolitoli Regency, Central Sulawesi for 12 weeks. Materials and Tools The materials used in this study are corncob that has been chemically fermented (Ammoniated), and sago pulp that has been biologically fermented. Male pea goats aged ± 1 year as many as 15 heads with a body weight range between 5-8 kg, forage feed mini elephant grass and gamal leaves that are raised by themselves. The equipment used in this study was a tenement cage placed in a main cage with a tin roof, wooden floor and walls. The plot shed is divided into 15plots with bulkhead boards, each measuring 1 x 0.75 meters each plot occupied by an experimental goat. All plots are equipped with feed troughs made of boards and a drinking area. Three days before the cage is used it is first cleaned and sprayed bayclin that has been diluted 15 cc per 10 liters of water, so that the cage is free from disease seedlings. Plastic buckets, Hanging scales, Digital scales (accuracy 0.01 mg); Machete; Stationery, cameras, plastic sacks or drums where feed is stored (Silo), cameras for documentation, broom sticks for floor cleaners, flashlights and sprays.

Research Procedure When goats arrive at the research pen, they are immediately put in the pen, then given forage feed and drinking water to avoid stress. After one day goats were given Kaloxy 1.5 cc tail-1 i.m to be more resistant to disease and albenol-300 worm medicine 0.5 tail-1 tablets. The second day, the goat is bathed to remove parasites that may have stuck to the skin. The first week, goats are injected with hematodine to aid growth and prevent stress from traveling in the shoulder area subcutaneously (s.c). Before sampling goats in the herder for 2 weeks around the research pen location for environmental adaptation, after the goats have been able to adapt, the goats are placed in group pens for 3 weeks given forage and corncob concentrate and sago pulp without treatment, the aim is to adapt feed. Goats that have consumed concentrate are moved in individual pens for 2 weeks to measure their consumption ability.

Feed treatment in this study 3 levels of treatment. First treatment 70% Forage + 15% corncob concentrate, 15% sago pulp concentrate given symbol (F1), second treatment 70% Forage + 10% corncob concentrate 20% sago pulp concentrate given symbol (F2), Third treatment 70% forage + 20% corncob concentrate 10% sago pulp concentrate given symbol (F3). All forage ingredients are chopped, feed treatment is given for 8 weeks based on feed requirements per head per day which is 2% of body weight. Feed is given three times a day, namely at 08.00 am given concentrate according to treatment, then 2 hours later given 1/2 forage feed (at 10 00 am) and in the afternoon 15.00 pm given the remaining feed, then drinking water is given during the day by storing in the feed place, after the next feeding where drinking water is removed from the feed area.

Observation parameters

Feed consumption is obtained by calculating the difference between the amount of feed given and the amount of feed remaining each day, calculated by the following formula::

$$feed\ consumption = feed\ given\ (gr) - feed\ residue\ (gr)$$

Body weight gain is calculated every week by calculating the difference between body weight at the end of the week and initial body weight. Measurements are carried out for 8 weeks.

$$\text{Calculating formula BWG: BWGD} = \frac{W2 - W1}{T2 - T1}$$

Information: BWGD = Daily live weight gain (kg)
W1 = Initial weight of weighing (kg)
W2 = Final weighing weight (kg)
T1 = Weighing start time (day)
T2 = End of weighing time (day)

Body temperature

Calculation refers to the formula, Schmidt-nielsen (1997) St = 0,86 Sr+0,14 Sk Information St = body temperature Sr = Rectal temperature Sk = Flat skin surface temperature The surface temperature of the skin is calculated according to the formula Schmidt-nielsen (1997) Sk= 0,25 (A+B)+ 0,32 C +,18 D.

Temperature measurements are carried out on the back just behind the shoulders (A), the chest just behind the armpits (B), the upper legs (C), and the front lower legs (metacarpal). Using a clinical thermometer inserted into the rectum within 1 minute at a low temperature between 03.00 to 04.30 and a high temperature of 11.30 to 13.00.

Digestibility of Dry Matter and Organic Matter The digestibility of dry matter (BK) and organic matter (BO) is determined by adding up the amount of feed given and the rest is recorded every day, all feces are removed for 24 hours, collected and weighed for 7 days, stool samples are taken 10% dried in the sun for 2 days, then in an oven with a temperature of 105^0C for the next analysis process digestibility dry matter measurement aims to determine the amount of nutrients that absorbed by the body using BK amount analysis of rations and feces. The digestibility of BK is calculated as follows:

$$Dry\ matter\ digestibility\ (\%) = \frac{Dry\ matter\ consumption\ (g) - stool\ dry\ weight\ (g)}{Dry\ matter\ consumption\ (g)} x100$$

The digestibility of Organic Matter (DOM) is calculated by the following formula:

$$Digestibility\ of\ organic\ matter\ (\%) = \frac{consumption\ of\ organic\ matter\ (g) - Faecal\ organic\ matter\ (g)}{consumption\ of\ organic\ \ (g)} x100$$

Data Analysis

The data obtained were processed using analysis of variance, using complete randomized design (CRD), 3 treatments and 5 repeats. The treatment given is a substitution for fresh forage in the form of mini elephant grass and gamal leaves, if there is a difference between the treatments, further tests are carried out with the Honest Real Difference (HRD) test (Steel and Torrie,1991).

III. Results and Discussion

Goat Feed Consumption

The results of the analysis of variance on the feed consumption of goats fed based on the treatment tested showed results that were not significantly different (P>0.05). The table below is the average consumption of goats based on treatment during the study. Feed consumption that did not differ significantly between

treatments showed that the use of Fermentation and Ammoniation methods to improve the quality of corn janggel feed and sago pulp did not have a negative influence on palatability. Feed consumption in this study was in the normal range when compared to the report Tarmidi (2004) which uses bagasse, which is 677 – 718 gr / day and reports Ramli, *et al.*, (2004) 1.500 gr/day.

Table 1. Average Animal Feed Consumption During the Study

No	Treatment	Feed consumption (g/head/day)
1	F1	194,10
2	F2	192,17
3	F3	198.05

Description: F1 = 70% forage + 15% corncob + 15% sago pulp, F2 = 70% forage + 10% corncob + 20% sago pulp, and F3 = 70% forage + 20% corncob + 10% sago pulp.

The constant palatibility between treatments shown by uniform feed consumption values, is the result of chemical and biological treatment of corncob and sago pulp used in fermentation ration mixtures against corncob can decompose crude fiber and provide a distinctive scent and taste so that livestock like. Chemical treatment through ammoniation of sago pulp has also been shown not to have a negative effect on feed consumption so as to support good palatability of the ration given.

Yulistiani (2010) reported that differences in the shape and type of feed ingredients used in preparing rations can cause differences in palatability levels which ultimately lead to differences in the amount of feed consumed by livestock. The uniformity of feed consumption in this study proves that the biological and chemical treatment applied to corn janggel and sago pulp produces an optimal behavioral response to goats in terms of feed consumption.

Feed consumption that is not significantly different is also reported by Kistom *et al.*, (2011) who use sago pulp silage as a concentrate. The average reported consumption of goat feed is 502 g / day.

Goat Weight Gain.

Body weight gain is the difference between initial body weight and final body weight at a certain time interval which is usually used to determine livestock growth performance. The results of this study show that the treatment of fermented janggel feed and ammoniated sago pulp as a result of improving feed quality through biological and chemical methods has a very real effect ($P<0.01$) on Daily Body Weight Increase (DBWI). The average DBWI of goats obtained during the study is presented in table 2.

Table 2. Average Daily Body Weight Gain of Goats during the study (g/head/day)

No	Treatment	DBWG (g/head/day)
1	F1	53.81^{a}
2	F2	59.90^{a}
4	F3	70.00^{b}

Description: different letters in the same column show markedly different treatment based on the 5% HRD test.

High DBWG in treatment with rations containing fermented and ammoniated feed is associated with better nutrient utilization than control rations. This is because the fiber component contained in corncob has been decomposed through fermentation and ammonia (Murni *et al*., 2008) and there is an increase in protein (Tampoebolon, 1997) so that the utilization of nutrients in feed is more optimal.

Fermentation of corncob can increase the ability to bond Calcium (Ca) with carbohydrates (Trinidad, *et al.*, 1996) so that the utilization of nutrients is more optimal. Calcium is known to play an important role in absorbing vitamin D contained in feed which serves an important function for the formation of bones and skeleton. Calcium together with Phosphore (P) plays an important role in maintaining acid-base balance and is involved in the preparation of cell membranes (Yano *et al*., 1991).

Body Temperature

Based on Table 3 it appears that the rectal temperature of male pea goats during the study was still in the normal range of 38, 23 oC to 39.25ºC. The normal rectal temperature range in goats was between 36.5 oC - 40.2 oC with an average rectal temperature of 38.7oC (Qisthon and Widodo, 2015: Suwignyo *et al.*, 2016 and Triaksono 2011). The results showed that there was a significant difference in the F3 treatment where the rectal temperature was lower than other treatments but still within the normal range. This shows that the difference in feed given based on treatment has a good physiological impact on facial status.

The low rectal temperature in the F3 treatment is related to the metabolic rate that occurs as a result of the use of different feeds. Feed on F3 contains ammoniated sago pulp which is lower than other treatments. Harmeyer and Martens, (1980) reported that urea plays an important role in nitrogen metabolism and is a precursor to protein biosynthesis. It is reported that in ruminants most of the nitrogen (60%) is obtained from the ammonia derivatives of the rumen. The use of F3 feed containing less ammoniated sago pulp allows protein metabolism to be more efficient in the use of ATP energy, causing a decrease in body temperature.

Nurmi (2016) reported that goats are livestock with a good level of adaptation to their environment, and are able to survive in environments with temperatures above average. A rectal temperature range that is in the normal range indicates that livestock are in a healthy or normal condition (Dhuhita *et al*., 2014).

The results of this study showed that the rectal temperature of Peanut goats was in the range between 34.86-38.04OC, almost the same as Suwignyo et al's 2016 research and research (Harmoko and Padang, 2019), namely 38.60 and 38.32-38.48 this is in accordance with the opinions of Yani and Purwanto (2006); Aryanto (2012); and Nurmi (2016) for the normal goat body temperature range is between 38.37-38.64 OC.

Table 3. Average rectal temperature of goats during the study

Information	Treatment		
	F1	F2	F3
Body temperature (^{O}C)	39.25^{b}	39.15^{b}	38.23^{a}

Description: different letters in the same column mean significantly on the 5% honest real difference test.

Digestibility of dry matter and organic matter

Table 4. Digestibility of Dry Matter and Organic Matter

Description	Treatment		
	F1	F2	F3
Digestibility of Dry Matter (%)	64,04	60,88	62,21
Digestibility of Organic Matter (%)	66,97	64,87	67,94

Table 4 shows that the digestibility of dry matter and organic matter differs markedly between treatments. The digestibility of dry matter and digestibility of organic matter are highest in F3 treatment. This is because in the F3 treatment, the composition of fermented ammoniated corncob is higher than other treatments. Corncob that undergoes chemical and biological treatment has a better digestibility value than other treatments because the binding structure of lignin and cellulose has decomposed well in the ammonia and fermentation processes.

Increased digestibility value in F3 treatment due to fungal activity in the fermentation process. This is according to the report of Hartono *et al*., (2015) that mushrooms have a good ability to degrade lignin. The increasing degradation of organic matter through the activity of this fungus increases the potential utilization of nutrients contained in feed. The highest digestibility of dry matter and digestibility of organic matter values in this study were in F3 treatment due to the increasing population of rumen microbes supported by more feed content containing fermented feed (fermented corncob). About 65% of feed digestibility in ruminants can increase due to the influence of increasing rumen microbial populations (ARC, 1984). In addition, the digestibility of feed is also influenced by the nutrient content in the feed and the flow rate of feed in the rumen (Orskop and Ryle, 1990). Increased digestibility of dry matter will affect the digestibility of other substances.

VI. Conclusion

Fermented-ammoniated corncob and ammoniated sago pulp given to male local kacang goats, with a composition of 70% forage + 20% corn cob+ 10% sago pulp, can increase body weight, body temperature and does not affect feed consumption digestibility of dry matter and organic matter, feed efficiency.

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