UTILIZATION ON WASTE CROP CORN AS A COMPLETE FEED FOR PREGNANT GOATS

by Anis Muktiani

Submission date: 05-May-2023 09:57PM (UTC+0700)
Submission ID: 2085147270
File name: UTILIZATION_ON_WASTE_CROP_CORN.pdf (192.05K)
Word count: 2168
Character count: 10404

RESEARCH ARTICLE

Advanced Science Letters

UTILIZATION ON WASTE CROP CORN AS A COMPLETE FEED FOR PREGNANT GOATS

A. Muktiani, E. Kusumanti and D.W. Harjanti

Faculty of Animal and Agricultural Sciences, Diponegoro Univercity, Semarang, Indonesia.

**Corresponding author email: anis.muktiani@gmail.com*

ABSTRACT

Corn plantation area in Indonesia reached 3.9 million hectares and produce corn plants waste approximately 87.5 million tons / year. This waste must be managed properly so as not to cause environmental problems. This study aimed to assess the utilization of corn straw as a complete feed for pregnant goats. Sixteen pregnant goats resulted from artificial insemination were used for this experiment. Design of the study was 2x2 factorial pattern with 4 replications. Four combinations of treatment are: T1S0 = ration of 28% corn straw (CP 14%, TDN 65%), T1S1 = T1 + mineral Zinc and Folic Acid, T2S0 = ration with 22% corn straw (CP 16%, TDN 67%), T2S1 = T2 + mineral Zinc and Folic Acid. Complete feed rations in the form of dry mash, given for 18 weeks. The results showed that there was no interaction between the treatment e.i ration quality with mineral supplementation of zinc and folic acid. The analysis with Duncan Multiple Range Test showed that the diet containing of 28% corn straw (CP 14%, TDN 65%) resulted in dry matter intake and daily body weight of pregnant goats which were higher than the diet containing of 22% corn straw (CP 16% , TDN 67%). While the mineral supplementation of zinc and folic acid did not affect both parameters. The T1S1 ration is the best among treatment applied according to dry matter intake and body weight gain which were reaching 823.63 g/d and 85.39 g/d. The conclusion of this study was the use of 28% corn straw in rations eligible for pregnant goats.

KEYWORDS: Corn straw, pregnant goats, dry matter intake, body weight gain.

1. INTRODUCTION

Corn production in Indonesia reached 19 million tons / year, it is the eighth ranks in the world corn production**1**. Data from the Directorate of Food and Agriculture in 2014, shows that the width of corn crop land of 3.96 hectares approximately, therefore it can be estimated that the production of fresh corn crop waste reach 87.5 million tons/year or 20.49 million tones of dry matter/year[2] This enormous waste production needs to be handled properlyso it might not be cause environmental problems. Among other ways is by using it as feedstuff material for composing complete feed for goats.

Etawa crossbred goat is a kind of sizable number of animals kept in Indonesia. In the period of pregnancy the female goat requires sufficient nutrients in order to produce a healthy offspring. A shortage of macro nutrients such as protein and energy will cause low birth weigh as well as production and quality of milk will be below standard[3] Besides,the pregnant goats also need vitamins and minerals, including folic acid and minerals Zinc (Zn).

Folic acid is a vitamin that is needed in nucleic acid synthesis. Insufficent folic acid will inhibit the nucleic acid synthesis and it causes the failure of cells to fascilitate DNA to replicate.This situation make the synthesis of proteins, lipids and myelin hampered and these can disturbthe process of embryogenesis as related to fetal and maternal fertility[4]

Mineral Zn is known as a trace mineral that is a constituent of the 300 kinds of enzymes, involved in the metabolism of proteins, amino acids, nucleic acids, lipids, carbohydrates and vitamins as well as build up the immune system[56]. The aim of this study was to find the right formulation ofration based on corn stoverwith the proper protein and energy content, and to test the supplementation of folic acid and zinc on pregnant goats upon the body weight gain.

2. EXPERIMENTAL DETAILS

The study was conducted over period of four months from April to July 2016 at the Faculty of Animal and Agricultural Sciences, Diponegoro University. The altitude of the location was +100 m above sea level and the

1936-6612/2012/4/3398/005 doi:10.1166/asl.2012.2049

temperature was around 30° – 33° C. Sixteen female goats of ±1year old with 30 ± 2.14 kg were used in this study. The animals were placed in individual cages equipped with food and drink. Every two weeks the animals were weighed on digital scales with the capacity of 150 kg and with 0.01 kg of precision. The compositions of the treatment ration are shown in Table 1.

The experimental design used was complete randomized design factorial pattern of 2x2. The first factor was 2 levels of the ration quality (T1 = CP14%, TDN 65% and T2 = CP 16%, TDN 67%), while the second factor was the S0 = without supplementation and S1 = supplemented with minerals and vitamins needed for fetal growth (zinc and folic acid). Four combinations of these treatments are:

T1S0: ration with CP14%, TDN 65%
T1S1: ration with CP 14%, TDN 65% + Zn 30 ppm and folic acid 200 μg
T2S0: ration with CP16%, TDN 67%
T2S1: ration with CP16%, TDN 67% + Zn 30 ppm and folic acid 200 μg.

TABLE 1. COMPOSITION OF DIETARY TREATMENT

T1: ration of 28% corn straw (CP 14%, TDN 65%)
T2: ration of 22% corn straw (CP 16%, TDN 67%)

Feedstuff	T1	T2
	----------%	----------
Corn stover	28	22
Rice meal	23	20
Cassava proccesed waste	6	7
Pollard	22	20
Soybean meal	8	13
Cocconut meal	10	15
Molasses	3	3
TOTAL	**100**	**100**
Nutrient contents:		
Crude Protein	14.01	16.27
Total Digestible Nutrients	65.03	67.51
Ash	9.55	9.26
Extract Ether	5.64	5.91
Crude Fiber	20.80	18.80
Nitrogen Free Extract	51.49	50.94
Neutral Detergent Fiber	40.89	39.27
Acid Detergent Fiber	22.29	21.23

Parameters measured were: 1) the feed dry matter intake, it is measured by substracting the amount of given feedstuff to the remaining feedstuff the next day; 2) daily weight gain,it is measured by substracting the final body weight with the initial body weight then divided by the length of maintenance; 3) feed conversion is the amount of required feedstuff to produce 1 kg of body weight; 4) feed efficiency, is the weight gain that produced from 1 kg of feedstuff which is expressed as a percentage. Data were analyzed using analysis of variance it will be continued with Duncan multiple range test if there is a finding of significant differences on the previous analyses [7].

3. RESULTS AND DISCUSSION

Dry matter intake and body weight gain of experimental goat are presented in Table 2. Results of analysis of variance shows there were interaction between diet and factor of supplementation quality upon the weight gain, but not for dry matter intake.

Dry matter consumption of thetreated goats ranged from 681.29 to 820.88 g/d (2.03 to 2.34% of body weight), it is lower than the standard of required DM according to NRC [8], which is 1400-1780 g/d for the late pregnant goat with 30-50 kg of body weight or about 2.4 to 2.7% of body weight. This is due to the low consumption of feedstuff in the form of dry mash. It showes that DM consumption in the ration with CP 16% and TDN 67% lower than the feedstuff containing of CP14% and 65% TDN. The decline of consumption might be caused by the increasing of energywhich made those goats feel full within a short time. These results are in line with the results of previous studies that the increase ofration energy will reduce the levels of consumption [9].

Just as dry matter intake, body weight gains of pregnant goats are low to moderate, ie. between 51.30 - 82.42 g/head/d. Eight-month-old goats are having immature body physiologically, so that they can increase body weight up to 55 kg when they are reaching 1 year old. The increase of energy should provide higher VFA in the rumen so that microbes will develop and provide microbial protein forthe animal. But this did not happen in T2 ration, because TDN and protein ratio in T2 is low (4.1). Other publication found that the TDN and CP ratio 5 provide better weight gain than 4 [10]. The smaller ratio between TDN and CP means that the higher content of CP in the diet. Dietary protein in the rumen will be degraded by the rumen microbial enzymes and produced ammonia. Due to the limitation of energy, the microbes cannot utilize the ammonia. Ammonia that is produced but not utilized in the rumen is absorbed, transformed into urea in the liver and returned into the circulation, from where it can return to the rumen via saliva or the rumen wall, and any excess is excreted in the urine. The process of changing ammonia to urea in the liver called ornithine cycle or urea cycle requires great energy. Every formation of one molecule of urea from CO_2 and NH_3 requires three ATP. This causes a lot of energy is lost. That is why the ratio TDN and CP were small is not efficient.

Based on that finding it can be noted that the ration levels of CP 14% and TDN 65% able to produce better body weight gain, while the minerals zinc and folic acid supplementation did not show any significant differences. Feed conversion in this study ranged from 10.82 to 16.38, while the feed efficiency ranged from 6.36 to 9.92%, it is better than the finding of other report who got a goat feed conversion of 15.84 to 16.81[11], while recent publication got a goat feed efficiency of 5.2 to 7.1%[12] .

*Authors to whom correspondence should be addressed

TABLE 2. DRY MATTER INTAKE CONSUMPTION AND BODY WEIGHT GAIN

Treatment	DMC (g/d)	ADG (g/d)	FC (%)	FE (%)
T1S0	820.88[a]	82.42[a]	10.82	9.92
T1S1	813.63[a]	75.39[b]	12.33	9.46
T2S0	735.07[b]	57.94[c]	12.72	7.90
T2S1	681.29[b]	51.30[d]	16.38	6.36

The superscript on the same rows and collums in different letters shows the significant of difference ($p<0.05$).
DMC: dry matter consumption; ADG: average daily gain; FC: feed conversion; FE = feed efficiency
T1S0 = ration of 28% corn straw (CP 14%, TDN 65%)
T1S1 = T1 + mineral Zinc and Folic Acid
T2S0 = ration with 22% corn straw (CP 16%, TDN 67%)
T2S1 = T2 + mineral Zinc and Folic Acid

4. CONCLUSION

In conclusion, complete feed made from dried corn straw 28%, CP 14% TDN 65% resulted in body weight gain,a good feed conversion and efficiency for pregnant goats. Supplementation with folic acid and Zn mineral does not change the appearance of pregnant goat production.

ACKNOWLEDGMENTS:

The author would like to thank Institutions of Research and Community Service Diponegoro University that has funded this research through PNBP funding of 2016 fiscal year.

REFERENCES AND NOTES

1. P. Ranum, J.P.P. Rosas and M.N.G. Casal.Global maize production, utilization, and consumption.*Ann. N.Y. Acad. Sciences* 1312, 105-112 **(2014).**
2. Direktorat Pangan dan Pertanian-Bappenas. 2014. Rencana Pembangunan Jangka Menengah Nasional (RPJMN) Bidang Pangan dan Pertanian 2015-2019. (*www.bappenas.go.id/index.php/download_file/view/15718/4661/).*
3. I.K. Sutama. Inovasinovasi teknologi reproduksi mendukung pengembangan kambing perah lokal. *Pengembangan Inovasi Pertanian* 4, 231-2 **(2012).**
4. A. Fleming and A.J. Copp. Embryonic Folate Metabolism and Mouse Neural Tube Defects. *Science*. 280, 2107-2109 (1998).
5. X. Fu-yu,., H. Ming-Hai, L. Wen-li, L. Yan-Qin, W. Ling-Ling, S. Jie and Z. Ji-Feng. Effect of different levels of zinc on bloodphysiological and biochemical parameters in studholsteinbulls. *Chinese J. Anim. Nutr*., 5:19 **(2007).**
6. Muktiani, A. Penggunaan Hidrolisat Bulu Ayam dan Sorgum serta Suplemen Kromium Organik Untuk Meningkatkan Produksi Susu Pada Sapi Perah. Disertasi Doktor. Sekolah Pascasarjana IPB. Bogor **(2002).**
7. R.G.D. Steel and J.H. Torrie.Principles and Procedures of Statistic.Mc Grow Hill Book Co. Inc. N.Y.**(1981).**
8. NRC. Nutrient Requirements of Goats: Angora, Dairy, and Meat Goats in Temperate and Tropical Countries **(1981).**
9. Y.A. Abdullah and S.M. Hussein SM. Effect of different levels of energy on carcass composition and meat quality of male black goats kids.*Livest. Sci*. 107 : 70-80 (2007).
10. Abbasi, S.A.; M.A.Vighio; S.A. Soomro; A.B. Kachiwal; A.A.Gadahi and G. L Wang. 2012. Effect of Different Dietary Energy Levels on the Growth Performance of Kamori Goat Kids. IJAVMS. 6: 473-479
11. Iswoyo dan Widiyaningrum. Pengaruh Jarak Waktu Pemberian Pakan Konsentrat dan Hijauan Terhadap Produktivitas Kambing Peranakan Etawah Lepas Sapih. Jurnal Ilmiah Ilmu-Ilmu Peternakan. XI (2): 70-74 **(2008).**
12. MM. Rahman, R.B. Abdullah, W.E.W. Khadijah, T. Nakagawa and R. Akashi. 2015. Feed intake and growth performance of goats fed with Napier grass and oil palm frond supplemented with soya waste.J. ofApp.Anim. Research. 53: 256-260 **(2015)**.

UTILIZATION ON WASTE CROP CORN AS A COMPLETE FEED FOR PREGNANT GOATS

ORIGINALITY REPORT

15%	11%	11%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	fapet.ipb.ac.id Internet Source	3%
2	pdfs.semanticscholar.org Internet Source	2%
3	M. R. M. Mostafa, A. A. Abdou, M.A. El Shora, Y.H. Hafez, A.M. Sakr, A.F.I. Abdel Latif, A.A. El-Giziry. "NUTRITIONAL STUDIES ON COMPENSATORY GROWTH PHENOMENON IN FATTENING BUFFALO CALVES", Egyptian Journal of Nutrition and Feeds, 2019 Publication	2%
4	e-journal.uajy.ac.id Internet Source	1%
5	zombiedoc.com Internet Source	1%
6	Retno Adiwinarti, I. Gede Suparta Budisatria, K. Kustantinah, R. Rusman, Edwin Indarto. "Effects of rations containing formaldehyde-	1%

protected soybean meal on meat production in Kacang goats", Veterinary World, 2019
Publication

7	A Muktiani, E. Kusumanti, D.W. Harjanti, J. Achmadi. "Feed efficiency and income over feed cost of Ettawa crossbred goats fed different quality of dry complete feed supplemented with mineral", IOP Conference Series: Earth and Environmental Science, 2020 Publication	1 %
8	Yayneshet, T.. "Feeding Acacia etbaica and Dichrostachys cinerea fruits to smallholder goats in northern Ethiopia improves their performance during the dry season", Livestock Science, 200812 Publication	1 %
9	jurnal.polbangtanyoma.ac.id Internet Source	1 %
10	ojs.unud.ac.id Internet Source	1 %
11	jurnal.usu.ac.id Internet Source	1 %
12	Rangel Fernandes Pacheco, Diego Soares Machado, Alexandra Fabielle Pereira Viana, Jullia Sehorek Teixeira, Lucas Milani. "Comparison of the effects of slow-release urea vs conventional urea supplementation	1 %

on some finishing cattle parameters: A meta-analysis", Livestock Science, 2021
Publication

13 Abbasi, Saeed, Muzafar Vighio, Saeed Soomro, Allah Kachiwal, Javaid Gadahi, and WANG Genlin. "Effect of different dietary energy levels on the growth performance of Kamori goat kids", International Journal for Agro Veterinary and Medical Sciences, 2012.
Publication

1 %

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		