

MAKING AND UTILIZATION OF HYDROLYZED OF FEATHER MEAL AND ORGANIC MINERAL TO IMPROVE RUMEN BIOPROCESS AND NUTRIENTS METABOLISM IN INCREASING RUMINANT PRODUCTION

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ABSTRACT

The objective of the research were (1) to introduce technology of making of restricted amino acid from feather meal and making of organic mineral (macro and micro mineral) (2) to evaluate effect supplementation mixed of hydrolyzed of feather meal, organic macro mineral (Ca and Mg-Polyunsaturated Fatty Acid /PUFA) and organic micro mineral (Zn, Cu, Cr, and Se-lysinate) on nutrient metabolism and daily gain of ruminant. The research was used 20 goats as material. The design of research was used Random block design consisted 4 treatments and 5 replications. The treatments were arranged : A= 40 % of forage + 60% concentrates; B= A + 3% of hydrolyzed of feather meal ; C= B + organic macro mineral (Ca and Mg -PUFA); D = C+ organic micro mineral (Zn, Cu, Cr, and Se-lysinate). The results showed that feathers meal treatment had no significant effect on rumen parameters, nutrient digestibility, and daily gain. Treatment of organic mineral (macro and micro mineral/(Ca and Mg-Polyunsaturated Fatty Acid /PUFA and Zn, Cu, Cr, and Se-lysinate)) could increase value of VFA, NH₃, energy digestibility and daily gain.

Keywords: hydrolyzed of feather meal, organic macro mineral, organic micro mineral

INTRODUCTION

Sulfuric amino acid (cystein, cysten, methionine) were restricted amino acids, that needed as precursor to improve optimum microbial growth. Feather meal was a resources of sulfuric amino acid. Feather meal contain high cystein (3.6g/16g N) (Cunningham *et al.*, 1994). Hydrolyzed feather meal contain 81% of crude protein. It was also resources of another restricted amino acids (valine, isoleusin, and leusin) (Muhtarudin, 2002).

Bioprocess of rumen and postruminal must be supported by mineral. Function of mineral were to optimalization of rumen bioprocess and nutrient metabolism. Supplementation of organic mineral could be increase availibility of these mineral and improve absorbtion by animal (Muhtarudin, 2003 and Muhtarudin *et al.*, 2003).

Supplementation of mixed feather meal and organic mineral could support optimalization of rumen bioprocess (by increasing microbial growth) and postruminal

(by increasing of absorbed nutrients) and improve nutrients metabolism (protein, carbohydrate, and lipids metabolism). So, they had positive effect on animal growth.

The objectives of the research were (1) to introduce technology of making of restricted amino acid from feather meal and making of organic mineral (macro and micro mineral) (2) to evaluate effect supplementation mixed of hydrolyzed of feather meal, organic macro mineral (Ca and Mg-Polyunsaturated Fatty Acid /PUFA) and organic micro mineral (Zn, Cu, Cr, and Se-lysinate) on nutrient metabolism and DAILY gain of ruminant.

MATERIALS AND METHODS

In vivo trial. The research used 20 goats as material. The design of research was used Random block design consisted of 4 treatments and 5 replications. The research was done for 4 month, consisted 15 day preliminary period, and 105 days collecting period.

The treatments were arranged as follow :

A= 40 % of forage + 60% concentrates;

B= A + 3% of hydrolyzed of feather meal ;

C= B + organic macro mineral (Ca and Mg -PUFA);

D = C+ organic micro mineral (Zn, Cu, Cr, and Se-lysinate).

The parameters measured were:

1. Volatile Fatty acid (VFA)
2. NH₃ was measured by micro diffusion of Conway.
3. Nutrient digestibility.
4. Daily gain of goats.

RESULTS AND DISCUSSION

Effect of Treatment on Rumen Parameter

Volatile fatty acid (VFA). The treatments had significant effect ($P < 0.005$) on VFA production in rumen. Value of VFA described metabolism activity of rumen microbial. It was indicated high activity metabolism of rumen microbial. Based on LSD (least significant different) test higher value of VFA were achieved by R2 and R3. So that Ca-PUFA (Ca-Polyunsaturated fatty acids/PUFA) and Mg-PUFA had positive effect on increasing value of VFA. Supplementation of micro mineral had no significant effect on microbial rumen activity. They function may be on postruminal. VFA was an energy resources for ruminant.

Table 1. The treatments effect of rumen parameter, digestibility and daily gain

No	Parameters	Treatments			
		R0	R1	R2	R3
1.	VFA (mMol)	103.80 ^b	106.30 ^b	121.30 ^a	121.30 ^a
2.	NH ₃ (mMol)	4.29 ^c	5.27 ^b	5.63 ^b	6.55 ^a
3.	Dry matter digestibility (%)	74.24 ^a	73.24 ^a	72.32 ^a	73.40 ^a
4.	Organic matter digestibility (%)	68.22 ^b	67.60 ^b	69.98 ^a	70.09 ^a
5.	Energy digestibility (%)	70.58 ^b	71.57 ^b	73.12 ^a	77.22 ^a
6.	Daily Gain (g/head/day)	60.23 ^a	82.24 ^a	85.89 ^a	99.63 ^a

^{a, b}Superscript are significantly different (P<0.05)

Ammonia (NH₃) rumen. The treatments had significant effect (P<0.05) on NH₃ concentration based on LSD test. Highest concentration of NH₃ was achieved by R3. Highest value of NH₃ may be supporting by degradation of lysine that resulting of NH₃. So, mixed of micro mineral could be degradable in rumen.

Treatments Effect On Nutrients Digestibility and Daily Gain

Nutrients Digestibility. The treatments had no significant effect on dry matter digestibility Value of dry matter digestibility showed good value on all treatments (72.32—74.24%). The same result on organic matter digestibility. They had high value (67.6--70.09%). The high value of digestibility may be caused by good quality of basal ration. Which had need all goats requirement of nutrients

The treatments showed had significant effect on energy digestibility. The treatments on R2 and R3 resulted higher value of digestibility compare with R0 and R1. The same resulted had showed on VFA production. The resulting of this research indicated that organic mineral of Ca, Mg, Zn, Cu, Se, and Cr had stimulated and activated some enzyme which had connected with energy metabolism.

Daily Gain. Daily gain parameter described of treatments effect on growth of goats. The dates on the table showed that the highest daily gain had achieved on R3, although between R2, and R3 had no significant effect. The highest daily gain showed that organic mineral both macro and micro, PUFA, and lysine had goats function lysine was restricted amino acids that could be increased of amino acid balances, so, metabolism of protein could be increased supported of growth. These was supported by PUFA which had stimulated of mineral absorbed.

CONCLUSION

Feathers meal treatment had no significant effect on rumen parameters, nutrient digestibility, and daily gain. Treatment of organic mineral (macro and micro mineral/(Ca and Mg-Polyunsaturated Fatty Acid /PUFA and Zn, Cu, Cr, and Se-lysinate)) could increase value of VFA, NH₃, energy digestibility and daily gain.

REFERENCES

- Cunningham, K.D.; M.J. Cecava; and T.R. Johnson. 1994. Flows of nitrogen and amino acids in dairy cows fed diets containing supplemental feather meal and blood meal. *J. Dairy Sc.* 77 : 3666-3675.
- Muhtarudin. 2002. Pengaruh Amoniasi, Hidrolisat Bulu Ayam, Daun Singkong, dan Campuran Lisin-Zn-Minyak Lemuru terhadap Penggunaan Pakan pada Ruminansia. Disertasi. Program Pascasarjana IPB. Bogor.
- Muhtarudin. 2003. Pembuatan dan penggunaan Zn-proteinat dalam ransum untuk meningkatkan nilai hayati dedak gandum dan optimalisasi bioproses dalam pencernaan ternak kambing. *Jurnal Penelitian Pertanian Terapan*. Vol. III (5): 385—393.
- Muhtarudin, Liman, dan Y. Widodo. 2003. Penggunaan Seng Organik dan *Polyunsaturated Fatty Acid* dalam Upaya Meningkatkan Ketersediaan Seng, Pertumbuhan, serta Kualitas Daging Kambing. Laporan Penelitian Hibah Bersaing Perguruan Tinggi.