Mineral Balance of *Brachiaria humidicola* Pasture which is Introduced with Creeping Legumes Creeping at UP3J

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Abstract

The purpose of this research was to study mineral balance of Brachiaria humidicola pasture which was introduced with creeping legumes. Plants materials used consisted of B humidicola, three kinds of legumes, i.e. Pueraria javanica, Centrosema pubescens and Calopogonium mucunoides, NPK fertilizer, manure and Soil Potential Microorganisms were obtained from Agrostology Laboratory, Faculty of Animal Science, Bogor Agricultural University. The experiment used block randomized design with eight treatments and four replications. AThe treatments were P_1: Control (Pasture concisted of Brachiaria humidicola), P_2: B. humidicola introduced with Pueraria javanica, Centrosema pubescens and Calopogonium mucunoides with NPK fertilizer of NPK), P_3: B. humidicola with P.javanica, P_4: B. humidicola with C. Pubescens, P_5: B. humidicola with C. mucunoides, P_6: B. humidicola with P. javanica and C. Pubescens, P_7: B. humidicola with P. javanica and C. mucunoides, P_8: B. humidicola with P. javanica, C. pubescens and C. Mucunoides. P_3 until P_8 used NPK half doses, manure and soil potential microorganisms. Parameters observed were level and intake of N, P, K, Ca, Mg from forage, blood serum, and sheep feces, dry matter consumption. The data were analyzed with analysis of variance and the differences between treatments were analyzed with Duncan Multiple Range Test (DMRT). Consumption of N in each treatment was not sufficient for the needs of N from a sheep everyday, except P_3, P_4 and P_7. Consumption of P in all treatments was not sufficient. Consumption of K and Mg for all treatments were sufficient. Consumption of Ca in each treatment was not sufficient, except P_4. The mineral imbalance of P and Ca occurred in all treatments except P2, N for P_1, and P_6, Mg for P_5 and P_8. The mineral balance occured on K. To solve the problem of mineral imbalance can be done with the addition of organic or inorganic fertilizers in pasture.

Keywords: pasture, legume and grass, mineral balance

Introduction

Excellent quality forages could result the best production of ruminants. Ruminants can consume a wide variety of forages plants. Feeding of legume forage will increase the protein intake needed by ruminants. High mineral uptake such as N, P, Ca from pasture can increase the quality of forage (Karti, 2010). The lack of mineral content from the forage in Pastures can result in mineral deficiency, especially for pregnant sheep because the minerals are also used for the development of the fetus. *Brachiaria humidicola* has an average protein content of 6.6% and 55% TDN (Vendramini *et al*, 2008), while the TDN requirement for pregnant sheep was 86% and 14.16% protein (NRC, 1985) at the age of 4 months pregnancy with a body weight 20-30 kg. Based on these requirement, the addition of feed in the pasture is necessary. One of them is by introducing creeping legume. The purpose of this research was to study mineral balance of *B. humidicola* pasture which is introduced with creeping legume.

Materials and Methods

The materials used consisted of pasture of *B. humidicola,* three *kinds of* creeping legumes, i.e. *Pueraria javanica*, *Centrosema pubescens* and *Calopogonium mucunoides,* NPK fertilizer, manure and Soil Potential Microorganism obtained from Agrostology Laboratory, Faculty of Animal Science, Bogor Agricultural University. The experiment used block randomized design with eight treatments and four replications. The treatments were P_1: Control (*Pasture of Brachiaria humidicola*), P_2: *B. humidicola* introduced with *Pueraria javanica*, *Centrosema pubescens* and *Calopogonium mucunoides* and fertilized with NPK), P_3: *B. humidicola* with *P.javanica,* P_4: *B. humidicola* with *C. Pubescens,* P_5: *B. humidicola* with *C. mucunoides,* P_6: *B. humidicola* with *P. javanica* and *C. Pubescens,* P_7: *B. humidicola* with *P. javanica* and *C. mucunoides,* P_8: *B. humidicola* with *P. javanica*, *C. pubescens* and *C. Mucunoides.* P_3 until P_8 used NPK half doses, manure and soil potential microorganisms. Parameters observed were level and intake of N, P, K, Ca, Mg from forage, blood serum, and sheep feces, dry matter consumption. The data were analyzed with analysis of variance and the differences between treatments were analyzed with Duncan Multiple Range Test (DMRT).

Results and Discussion

Consumption of dry matter in the treatment of P_2-P_8 is higher when compared with controls. The highest dry matter intake at P4 treatment. Introduction of legumes can increase dry matter intake. Consumption of dry matter of P_2-P_8 higher than the control due to the introduction of legume. Intake of N, P, K, Ca was higher in $P_{2-}P_8$ compared with controls. Intake of N, P, Ca was highest in P_4, K intake in P_3,

Table 1. Mineral consumption of N, P, K, Ca and Mg, which is absorbed (in serum) and the waste (the feces) on *B. humidicola* Pasture which is introduced with legume creeping

Treatments	DM Consumption (g/ekor/hari)	Mineral Intake (g)					Serum (g)					Feses (g)				
		N	P	K	Ca	Mg	N	P	K	Ca	Mg	N	P	K	Ca	Mg
1	592.08	6.28	0.59	5.74	1.48	2.49	0.02	0.02	0.29	0.14	0.01	6.75	1.12	2.19	7.87	1.36
2	753.75	7.91	1.28	14.32	2.19	1.96	0.02	0.02	0.41	0.16	0.02	7.24	1.06	2.11	9.95	1.36
3	1001.71	16.83	1.20	18.33	4.31	3.01	0.04	0.03	0.59	0.22	0.03	12.52	1.50	2.50	17.33	2.20
4	1121.14	22.09	1.46	15.58	7.18	2.58	0.03	0.02	0.41	0.24	0.03	11.10	1.79	2.69	19.28	2.35
5	884.57	12.12	1.06	15.83	3.63	1.95	0.03	0.03	0.38	0.21	0.02	11.15	1.50	5.13	14.95	2.03
6	985.30	12.81	0.99	10.44	3.84	2.96	0.04	0.03	0.35	0.22	0.03	12.91	1.68	1.87	23.06	2.27
7	1004.07	15.36	1.10	15.56	5.42	3.01	0.03	0.02	0.44	0.21	0.03	11.45	1.81	1.71	17.47	2.31
8	958.09	13.7	0.77	14.08	5.27	2.01	0.03	0.03	0.30	0.21	0.02	10.92	1.25	1.92	16.19	2.11

P_1: Control (*Pasture of Brachiaria humidicola*), P_2: *B. humidicola* introduced with *Pueraria javanica*, *Centrosema pubescens* and *Calopogonium mucunoides* and fertilized with NPK), P_3: *B. humidicola* with *P.javanica,* P_4: *B. humidicola* with *C. Pubescens,* P_5: *B. humidicola* with *C. mucunoides,* P_6: *B. humidicola* with *P. javanica* and *C. Pubescens,* P_7: *B. humidicola* with *P. javanica* and *C. mucunoides,* P_8: *B. humidicola* with *P. javanica*, *C. pubescens* and *C. Mucunoides.*

Mg intake in P_3 and P_7. Mg intake was lowest in P_5. Introduction of legumes can increase the intake of N,P, K, Ca and Mg. Uptake of N, K, Ca, Mg were higher in P_3-P_8 compared with P_2 and control. N uptake was highest in P_4 and P_6, P uptake in P_3, P_5, P_6 and P_8, K uptake was highest in P_3, P_4 uptake on Ca and Mg uptake in P_3, P_4, P_6, P_7. Introduction of legumes can increase the uptake of N, P, K, Ca, Mg. Mineral retention of N, P, and Mg were higher in treatment P_3-P_8. Mineral retention of N, P, K, Ca and the highest in P_6, P_7, P_5, P_6 and P_4. Introduction of legumes can increase the retention of mineral N, P, K, Ca and Mg.

Table 2. Mineral balance (without urine) in *B. humidicola* pasture which is introduced with legume creeping

Treatments	Mineral Balance(g)				
	N	P	K	Ca	Mg
P1	-0.49	-0.55	3.26	-6.54	1.11
P2	0.65	0.21	11.81	-7.92	0.59
P3	4.27	-0.33	15.23	-13.25	0.78
P4	10.95	-0.36	12.48	-12.34	0.2
P5	0.95	-0.47	10.33	-11.53	-0.11
P6	-0.14	-0.72	8.22	-19.44	0.66
P7	3.88	-0.73	13.41	-12.26	0.68
P8	2.75	-0.51	11.86	-11.13	-0.12

P_1: Control (*Pasture of Brachiaria humidicola*), P_2: *B. humidicola* introduced with *Pueraria javanica*, *Centrosema pubescens* and *Calopogonium mucunoides* and fertilized with NPK), P_3: *B. humidicola* with *P. javanica,* P_4: *B. humidicola* with *C. Pubescens,* P_5: *B. humidicola* with *C. mucunoides,* P_6: *B. humidicola* with *P. javanica* and *C. Pubescens,* P_7: *B. humidicola* with *P. javanica* and *C. mucunoides,* P_8: *B. humidicola* with *P. javanica*, *C. pubescens* and *C. Mucunoides.*

Nitrogen balance in P_1 and P_6 showed a negative value means there is imbalance of nitrogen, and indicating that soil in this treatment is deficiency with nitrogen. Magnesium balance in P_5 and P_8 showed a negative value means there is imbalance of magnesium, and indicating that soil in this treatment is deficiency with magnesium. Phosphorus imbalance in all treatments except P_2. P_2 is the treatment is given with NPK fertilizer with a higher P levels compared with other treatments. The mineral imbalance occurred on Ca, but mineral balance occurred on K. Mineral balance can be improved by the introduction of legume and fertilizer P and Ca by using organic or an organic fertilizers in pasture. If not done can cause mineral deficiencies of Ca and P, and resulting in decreased growth.

Conclusions

Consumption of N in each treatment was not sufficient for sheep requirement, except P_3, P_4 and P_7. Consumption of P in al treatments were not sufficient. Consumption of K and Mg for all treatments were sufficient. Consumption of Ca in each treatment was not sufficient, except P_4. Introduction of legumes can increase consumption of dry matter, intake, uptake and retention of mineral N, P, K Ca and Mg

The mineral imbalance of P and Ca occurred in all treatments except P_2, N for P_1 and P_6, Mg for P_5 and P_8. The mineral balance occured on K. To solve the problem of mineral imbalance can be done with addition of organic or anorganic fertilizers in pasture.

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