ຜົນຂອງເຟືອງໝັກຢູເຣຍ ແລະ ປູນຂາວຕໍ່ປະລິມານການກິນໄດ້, ການຍ່ອຍໄດ້ ແລະ ອັດຕາການຈະເລີນເຕີບໂຕຂອງງົວພື້ນເມືອງ

ວຽງສະກຸນ ນາປະເສີດ[1] ແລະ ບຸນຈັນ ມະນີແສງ[1]*

ບົດຄັດຫຍໍ້

ການທົດລອງຄັ້ງນີ້ ມີຈຸດປະສົງເພື່ອປຽບທຽບການກິນໄດ້, ການຍ່ອຍໄດ້ ແລະ ອັດຕາການຈະເລີນເຕີບໂຕຂອງງົວພື້ນເມືອງ ທີ່ລ້ຽງດ້ວຍເຟືອງໝັກຢູເຣຍ ແລະ ປູນຂາວ. ການທົດລອງໄດ້ປະຕິບັດຢູ່ທີ່ພາກວິຊາລ້ຽງສັດ ແລະ ການປະມົງ, ຄະນະກະເສດສາດ, ມະຫາວິທະຍາໄລແຫ່ງຊາດ. ການທົດລອງຄັ້ງນີ້ ໄດ້ໃຊ້ງົວພື້ນເມືອງ ຈຳນວນ 16 ໂຕ, ນ້ຳໜັກສະເລ່ຍ 138 ± 24 ກລ., ໂດຍແຜນການທົດລອງແບບບ່ອກສົມບູນ. ສັດທົດລອງທັງໝົດ ໄດ້ຮັບອາຫານທີ່ເປັນປັດໄຈການທົດລອງແບບກິນເຕັມທີ່ ແລະ ໄດ້ໃຫ້ອາຫານຂຸ້ນເສີມທີ່ມີທາດຊຶ້ນລວມ 14 ສ່ວນຮ້ອຍ ຈຳນວນ 750 ກຼາມຕໍ່ມື້. ຜົນຂອງການທົດລອງພົບວ່າ ການກິນໄດ້ລວມຕໍ່ພື້ນທີ່ໂຕຂອງສັດ ທັງໃນສູດເຟືອງແຫ້ງ ແລະ ເຟືອງໝັກຢູເຣຍ ບໍ່ມີຄວາມແຕກຕ່າງກັນທາງສະຖິຕິ, ແຕ່ພົບວ່າ ມີຄວາມແຕກຕ່າງກັນ ລະຫວ່າງ ເຟືອງໝັກປູນ ແລະ ເຟືອງໝັກຢູເຣຍປະສົມກັບປູນຂາວ (75.55; 74.93; 52.79 ແລະ 55.41 g/d, ຕາມລຳດັບ). ເຖິງຢ່າງໃດກໍຕາມ, ການຍ່ອຍໄດ້ຂອງວັດຖຸແຫ້ງຂອງເຟືອງໝັກຢູເຣຍ ປະສົມກັບປູນຂາວມີຄ່າສູງສຸດ ເມື່ອທຽບກັບ ເຟືອງແຫ້ງ, ເຟືອງໝັກຢູເຣຍ ແລະ ເຟືອງໝັກປູນຂາວ (63.29; 61.35; 56.27 ແລະ 55.67 %, ຕາມລຳດັບ). ນ້ຳໜັກເພີ່ມສະເລ່ຍຂອງສັດທົດລອງທີ່ໄດ້ຮັບເຟືອງໝັກຢູເຣຍ ບໍ່ມີຄວາມແຕກຕ່າງກັບເຟືອງແຫ້ງ ແຕ່ມີຄວາມແຕກຕ່າງກັນ ເມື່ອທຽບກັບເຟືອງໝັກຢູເຣຍ ປະສົມກັບປູນຂາວ ແລະ ເຟືອງໝັກປູນຂາວ (0.24; 0.20; 0.18 ແລະ 0.05 kg/d, ຕາມລຳດັບ).

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[1]ພາກວິຊາລ້ຽງສັດ ແລະ ການປະມົງ ຄະນະກະເສດສາດ ມະຫາວິທະຍາໄລ ແຫ່ງຊາດ.

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Effects of rice straw treated with urea and lime on voluntary feed intake, nutrients digestibility and growth performance in Native cattle

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Abstract

The objectives of this experiment were compare feed intake, nutrients digestibility and growth performance of the cattle when feed by four dietary treatments (Rice straw, RST; Urea-treated rice straw, UTR; Lime-treated rice straw, LTR and Urea and lime-treated rice straw, ULTR). The experiment was carried out at department of Livestock and Fisheries, Faculty of Agriculture, National University of Laos. Sixteen native cattle of about 138 ± 24 kg of body weight according to randomized completely block design, RCBD. All of animal were feed ad libitum of dietary treatments and supplement with concentrate feed 14% CP; 750 g/h/d. The result shown that metabolic intake of RST and UTR not differed significantly, but both of them differed significantly with LTR and ULTR (75.55; 74.93; 52.79 and 55.41 g/d respectively). However, dry meter digestibility of ULTR was highest differed significantly with RST, UTR and LTR (63.29; 61.35; 56.27 and 55.67% respectively). An average daily gain of UTR not differed significantly with RST but significant different with ULTR and LTR (0.24; 0.20; 0.18 and 0.05 kg/d respectively).

Key word: *Treated- rice straw, Urea, Lime, feed intake, Digestible nutrients, Growth performance, Lao native cattle.*

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Introduction

Rice straw is a potential roughage for ruminant in the dry season, but is-characterized by high fiber level (39-53 %ADF) and unbalance nutrient as low of nitrogen (2-4%CP), vitamins, mineral and soluble carbohydrates. However, rice straw difficult to digest and degrade for ruminant 41-59%DMD (Napasirth *et al*., 2005; Susuki *et al*. 2004; Bui Van Chinh *et al*., 2001; Tran Quoc Viet *et al*. 2001 and Wanapat, 1990). Therefore, there exist in principal two ways for improving the feeding value of rice straw: one, which of technological nature, is delignification treatment and two, which is of nutritional nature, is nutrients supplementation (Chenost, 1995), other way is improving rice straw by physical, Chemical or Biological (Sundstol, 1984; Wanapat, 1984; Doyle *et al*., 1986). The present improving for rice straw by non protein nitrogen urea ($CO(NH_2)_2$) and lime (CaO) is interesting for increase nitrogen and degradation for animal (Nguyen Xuan Trach *et al*., 2001).

Materials and Methods

Treatments and experimental design

This experiment was carried out at the faculty of agriculture, national university of Laos. Sixteen native cattle with an average live weight of 138 ± 24 kg, The animals were individually pens, allowed free access to drinking water. All of animal was deworming, during 15 days adaptation period, feed were offered individually to animal according to randomized completely block design, RCBD.

T1 = Rice straw (RST)

T2 = 5% Urea treated rice straw (UTR)

T3 = 10% Lime treated rice straw (LTR)

T4 = 5% Urea and 10% Lime treated rice straw (ULTR)

Feed preparation and feeding

Rice straw was treated with 5% urea, 10% lime and % urea plus 10% lime on the dry weight basis. The urea and lime solution (5 kg of urea, 10 kg of lime and 5 kg of urea plus 10 kg of lime were dissolved in 100 liters of water) was sprayed on 100 kg of dried rice straw respectively, then stored in the cement tank, covered and sealed for 14 days before fed to animal. All of animal was offered ad libitum of roughage dietary treatments and supplemented with 14% CP, 750 g/h/d of concentrate. The dietary treatment were offered in the tree time (06.00, 11.00 and 16.00 o'clock).

Data collection and Measurements

Chemical composition of feed, Feed intake and Feed digestibility

Every two week feed was corrected to analyzed chemical composition at Animal laboratory of Faculty of Agriculture National University of Laos: dry meter, DM; Ash; Crude protein, CP; pH, and Ammonia, NH_3 (AOAC, 1984); Neutral Detergent Fiber, NDF; Acid Detergent Fiber, ADF (Van Soest *et al*., 1991). Feed offered and refusal was recorded daily to calculate feed intake, and last five days feces was corrected to analyzed nutrients digestible (Vankeulen and Young, 1991) and the body weight of animal was weighed at before and after

experiment to estimate average daily gain.

Statistical analysis

The experiment data were analyzed according to the ANOVA model by statistic analysis system, SAS (1996) version 6.12. Duncan's Multiple rang Test.

Results and Discussion

Chemical composition of feed

The result are shown in table 2 the rice straw had high DM and Ash content (90.66, 13.33%). However %CP content of UTR so higher than ULTR, LTR also RST (8.24; 6.88; 6.56 and 4.01% respectively and the rice straw treated lime plus urea was lowest ADF (45.12%). Both of urea and lime were effective in delignifying rice straw. But lime seemed to be more powerful than urea (Vu Duy Gaing and Nquyen Xuan Trach, 2001).

Feed intake

The metabolic intake of rice straw treated lime alone were lower than rice straw, lime treated rice straw and urea plus lime treated rice straw that may be due to high level of lime to reduced palatability of rice straw. However, there was not significant difference in body weight intake between urea treated rice straw and rice straw as well as lime treated rice straw and urea plus lime treated rice straw (shown in the table 3).

Nutrients intake and Nutrients digestibility

Rice straw treated urea plus lime was increase dry meter digestibility more than rice straw treated urea alone and lime alone. Vu Duy Gaing and Nquyen Xuan Trach, (2001) have also found that combination between urea and lime higher than urea treated rice straw and lime treated rice straw alone.

Growth performance

5% Urea treated rice straw was higher improved average daily gain than of all of dietary treatments but that not significant with rice straw.

Conclusions

The results from the experiment shown that the animal fed from dietary treatment of urea treated-rice straw to be higher average daily gain than rice straw, urea plus lime treated-rice straw and lime treated-rice straw respectively.

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Table 1: Concentrate feed formulation.

Feed staffs	Ration
Cassava chip	50
Rice bran	26
Soy bean meal	20
Urea	1
Molasses	2
Salt	0.5
Mineral	0.5
Total	**100**
%CP	**14**

Table 2: Chemical composition of feed.

Chemical composition	Treatments				Concentrate
	RST	UTR	LTR	ULTR	
DM, %	90.66	33.69	36.52	42.59	90.50
	----------% of DM----------				
OM, %	77.33	34.98	30.06	29.91	83.93
CP, %	4.01	8.24	6.56	6.88	13.25
NDF, %	65.89	72.64	64.25	60.57	10.42
ADF, %	52.13	52.50	47.39	45.12	10.18
Ash, %	13.33	3.78	6.46	7.61	6.57
NH_3-N, %	-	0.75	0.05	0.53	-
pH	-	8.60	7.80	8.40	-

Table 3: Effects of urea and lime treated rice straw on voluntary feed intake.

Feed intake	Treatments				P - value	SEM
	RST	UTR	LTR	ULTR		
Concentrate intake						
DM, KgDM/d	0.75	0.75	0.75	0.75	-	-
BW, %BW/d	0.64	0.44	0.40	0.39	0.6524	0.0426
MW, g/KgW$^{0.75}$/d	15.20	14.93	13.89	13.55	0.6745	1.0952
Roughage intake						
DM, KgDM/d	2.30^{a}	2.29^{a}	1.59^{b}	1.82^{ab}	0.0003	0.0820
BW, %BW/d	1.80^{a}	1.78^{a}	1.13^{b}	1.20^{b}	0.0003	0.0820
MW, g/KgW$^{0.75}$/d	60.35^{a}	60.00^{a}	38.90^{b}	41.86^{b}	0.0003	2.6180
Total intake						
DM, KgDM/d	2.87^{a}	2.86^{a}	2.16^{b}	2.39^{ab}	0.0631	01.892
BW, %BW/d	2.26^{a}	2.23^{a}	1.53^{b}	1.59^{b}	0.0008	1.1027
MW, g/KgW$^{0.75}$/d	75.55^{a}	74.93^{a}	52.79^{b}	55.41^{b}	0.0002	2.6773

$^{a, b}$ means within rows with different superscripts differ significantly ($P<0.05$), BW = Body weight, MW = Metabolic weight.

Table 4: Effects of urea and lime treated rice straw on nutrients intake and nutrients digestibility.

Nutrients	Treatments				P - value	SEM
	RST	UTR	LTR	ULTR		
Intake (KgDM/d)						
DM	2.87[a]	2.86[a]	2.16[b]	2.39[ab]	0.0631	0.1892
OM	2.26[ab]	2.63[a]	1.91[b]	2.10[ab]	0.0660	0.1642
CP	0.17[b]	0.26[a]	0.18[b]	0.20[b]	0.0011	0.0117
NDF	1.58[a]	1.72[a]	1.08[b]	1.16[b]	0.0128	0.1223
ADF	1.26[a]	1.26[a]	0.81[b]	0.88[b]	0.0126	0.0939
Digestibility (%)						
DM	61.35[b]	56.27[c]	55.67[c]	63.29[a]	0.0001	0.5118
OM	62.53[d]	65.98[b]	64.52[c]	71.67[a]	0.0001	0.3899
CP	56.08[b]	59.09[ab]	61.42[a]	56.87[b]	0.0053	1.2399
NDF	60.47[c]	62.38[b]	56.33[d]	67.02[a]	0.0001	0.2659
ADF	73.33[d]	81.46[b]	76.25[c]	83.63[a]	0.0001	0.1113

[a, b, c] means within rows with different superscripts differ significantly (P<0.05)

Table 5: Effects of urea and lime treated rice straw on growth performance.

Items	Treatments				P-value	SEM
	RST	UTR	LTR	ULTR		
Weight change						
Initial weight (Kg/h).	130.50	128.38	151.63	141.38	0.6483	14.2158
Final weight (Kg/h).	144.13	145.00	155.00	153.88	0.9233	14.5179
ADG (Kg/d).	0.20[ab]	0.24[a]	0.05[c]	0.18[b]	0.0001	0.0145
Live weight gained (Kg/period)	13.62[ab]	16.62[a]	3.37[c]	12.50[b]	0.0001	1.0259

[a, b] means within rows with different superscripts differ significantly (P<0.05)

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Figure 1: Rice straw treatment.

Figure2: Feeding the cattle.

Figure 3: Cattle weight measuring.