

Urea-ensiled rice straw as a feed for cattle in Thailand

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Rice-straw was ensiled with a 5–6% urea solution for 3 weeks before being fed. Cattle fed with urea-ensiled rice straw alone can maintain weight. However, to obtain a daily weight gain of 300–450 g in Holstein Friesian heifers (8–12 months old) fed with urea-ensiled rice straw it is necessary to supplement with some form of concentrate.

Rysstrooi is ingekuil met 'n 5–6% ureum oplossing 3 weke voordat dit gevoer is. Beeste wat alleenlik met die ureum-gekuilde rysstrooi gevoer is, het hul gewig behou. Dit was egter nodig om die ureum-gekuilde rysstrooi aan te vul met 'n vorm van konsentraat om 'n daaglikse gewigstoename van 300–450 g in Holstein Friesverse (8–12 maande oud) te verkry.

Keywords: Rice straw, urea-ensiled, supplementation, concentrates, chemical composition, digestibility.

Introduction

Currently there is a great deal of interest worldwide in improving the utilization of low-quality roughage and straw. Rice straw contains about 3% crude protein (air-dry basis), 35% crude fiber and 1900 kcal DE/kg of straw. Because of its low energy and protein content, the straw alone can not support normal growth, causing a loss of body mass. The feeding of straw with some concentrate (1,5 kg/h/d) to growing cattle can maintain body mass but with little or no daily gain (80 g). New techniques of improving the straw quality are the treatment and supplementation of straw by various means involving chopping, ensiling, soaking or spraying with alkali, or urea and molasses solution.

Table 1 Chemical composition and digestibility of concentrate and various roughages

Component (%)	Feedstuff					
	Conc.	Rice straw	Para grass silage	Para grass hay	Urea-ensiled rice straw	Fresh para grass
DM	88	90	20	91	57	26
Ash	8,64	14,84	3,07	6,83	11,60	2,85
EE	8,25	2,00	1,29	3,32	3,09	1,51
CF	16,10	38,13	7,29	32,99	21,11	8,94
CP	13,00	2,76	1,20	4,93	4,99	2,41
NFE	42,01	32,27	6,78	42,83	16,21	9,99
OM Dig	74,3	50,5	53,0	55,2	53,0	53,6
TDN	65,0	40,2	8,5	43,1	24,1	10,2

Results and Discussion

The technique that is acceptable and being recommended in Thailand is the mixing of an equal mass of rice straw with a solution of 5–6% urea, with or without small amounts of salt and/or molasses. The wet straw is covered with a plastic sheet and ensiled for about 3 weeks before it is fed to the animals. The urea-treated straw should be removed or the stack opened for one day before feeding to get rid of ammonia gas, then the treated straw may be dried and kept for day-to-day feeding. The cattle fed with

Table 2 Performance of crossbred heifers (Holstein crosses) fed with different roughage and concentrate mixture for 107 days (Promma, Rataravanich, Tooykampee, Withayakorn & Suvapap, 1982)

Measurement	Roughage source				
	Rice straw	Para grass silage	Para grass hay	Urea-ensiled rice straw	Fresh para grass
Initial weight (kg)	173	168	170	171	166
Total weight gain (kg)	8,5	32,0	46,3	46,1	42,9
ADG (gm)	79	299	433	431	401
Roughage DM eaten (kg)	4,33	0,93	2,76	3,59	2,77
*Conc. DM eaten (kg)	1,32	1,32	1,32	1,32	1,32
DMI (kg/d)	5,65	2,25	4,08	4,91	4,09
DMI (as % of BM)	3,20	1,22	2,11	2,53	2,18
Feed DM/kg gain	71,50	7,50	9,41	11,16	10,24

*Concentrate mixture (13 % CP) contained 35 kg rice brain, 40,6 kg corn, 9,4 kg soybean meal, 10 kg coconut meal, 2 kg mineral, 2 kg bone meal and 1 kg salt.

Table 3 Performance of crossbred heifers fed with different roughages (Promma *et. al.*, 1982)

Measurement	Roughage source			
	Para grass hay (PGH)	PGH + conc. (12% CP)	Urea-ensiled rice straw (UES)	UES + conc. (12% CP)
Crossbred Brahman Heifers				
Initial mass (kg)	191	191	190	192
Total mass gain (kg)	2	36	3	42
ADG (g)	23	360	36	419
Roughage DMI (kg/d)	4,3	4,5	5,1	5,2
Conc DMI (kg/d)	—	1,29	—	1,29
Crossbred Holstein Heifers				
	UES + conc. (15% CP)	UES + conc. (13% CP)	UES + conc. (12% CP)	
Initial mass (kg)	206	205	204	
Total mass gain (kg)	31	39	39	
ADG (g)	315	391	393	
Roughage DMI (kg/d)	5,94	5,96	5,95	
Conc DMI (kg/d)	1,37	1,30	1,29	
Feed DM/kg gain	23,21	18,57	18,44	

Table 4 Chemical composition of rice straw and cassava chip

*Component (%)	Feedstuff		
	Cassava chips	Rice straw	Urea-ensiled rice straw
DM	88,8	92,7	50,5
CP	2,7	3,5	7,3
Ash	4,3	14,6	15,0
EE	0,31	0,71	0,62
CF	3,2	34,3	37,9
NFE	89,2	46,6	38,9
ADF	5,9	49,2	56,1
ADL	2,4	3,9	3,5
Ca	0,39	0,62	0,58
P	0,33	0,10	0,11

*All expressed as % on DM basis except for DM (% as fed).

urea-ensiled rice straw alone, can maintain normal growth and sometimes increase body mass (ADG of 35–400 g). Generally, to obtain a daily mass gain of 300–450 g in crossbred heifers (8–12 months old) fed with urea-ensiled rice straw, some supplementation is required, using about 1,5 kg/d of a concentrate mixture. The mixture can be very simple (95 kg rice bran, 2 kg mineral, 2 kg bone meal and 1 kg salt) which gives a crude protein content of 12%. The results obtained are detailed in Tables 1–5.

In conclusion, urea-ensiled rice straw supplemented with some concentrate for growing cattle is as good as para grass hay or fresh grass supplemented with concentrate. Other sources of supplementation such as rubber seed meal, oil palm meal, chicken manure and *Leucaena* leaves are being investigated. Furthermore, the pelleting or cubing of the straw and concentrate as a complete ration to increase feed intake and digestibility should be evaluated.

Table 5 Performance of crossbred yearling steers fed with rice straw during the dry season (Wannapat, Prasertsak, Chanthai & Siwaprapakorn, 1983)

Measurement	Roughage source			
	Rice straw (RS)	Urea-ensiled rice straw (UES)	Rice straw + cassava chip	UES + cassava chip
ADG (g)	–134	430	–312	75
Feed consumption (kg/animal/day)				
Straw	4,97	6,82	2,69	4,82
Cassava	—	—	1,34	1,77
Total	4,97	6,82	4,03	6,59

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