PROJECT NO. __RU-4_

ANNUAL REPORT
COMPREHENSIVE RESEARCH ON RICE
January 1, 2005 - December 31, 2005

PROJECT TITLE:

PROJECT LEADER: Richard A. Zinn
1004 E. Holton Rd.
El Centra, CA 92243

PRINCIPAL UC INVESTIGATORS: Richard A. Zinn
Professor
Animal Science Department
University of California, Davis

COOPERATORS: A. Plascencia

LEVEL OF 2003 FUNDING: $24,000

OBJECTIVES AND EXPERIMENTS CONDUCTED BY LOCATION TO ACCOMPLISH OBJECTIVES:

1) Feedlot growth-performance trial to evaluate synergy between surfactant treatment of rice straw and maceration on the feeding value of rice straw for feedlot cattle
2) Metabolism trial to evaluate treatment effects on digestive function.

SUMMARY OF 2005 RESEARCH (MAJOR ACCOMPLISHMENTS) BY OBJECTIVE:

Trial 1. One hundred and twenty-five Holstein steers were used in a 188-d trial to evaluate the synergy between maceration and the use of a surfactant (Tween 80) on the feeding value of rice straw. Treatments consisted of a steam-flaked corn-based diet containing 15% forage (DM basis) as follows: 1) sudangras hay; 2) ground rice straw; 3) ground rice straw plus 0.22% of tween 80; 4) macerated rice straw, and 5) macerated rice straw plus 0.22% of tween 80. All forages were ground to pass through a 2.6 cm screen prior to incorporation into complete mixed diets.There were no interactions between maceration and surfactant on growth-performance or carcass characteristics. Drymatter intake was similar ($P > 0.20$) across treatments, averaging 8.03 kg/d. However, maceration of rice straw increased carcass adjusted ADG (6%, $P < 0.10$), gain efficiency (6%, $P < 0.05$), and dietary NE (5%, $P < 0.05$) compared with grinding, alone. Given that the NEm and NEg of sudangrass hay are 1.18 and .62 Mcal/k, respectively (NRC, 2000), then the corresponding NEm and Neg values are 0.61 and 0.04 respectively for ground rice straw, and 1.25 and 0.61 for macerated rice straw, respectively. Compared with grinding, alone, macerated rice straw supplemented diets increased ($P < 0.05$) carcass weight (3.2%), dressing percentage (1.7%) and quality grade (4.01 vs 4.29). We concluded that the maceration increasing the feed value of rice straw to a level similar to that of good-quality (harvested at the flag stage of maturity) sudangrass hay.

Trial 2. Five Holstein steers with cannulas in the rumen and proximal duodenum will be used in a 5 × 5 Latin square experiment. Treatments consisted of a steam-flaked corn-based finishing diet containing 15% forage (DM basis) as sudangrass hay, ground rice straw, ground rice straw plus 0.25% Tween 80, macerated rice straw, or macerated rice straw plus 0.25% Tween 80. Diets were the same as Trial 1 with inclusion of Cr_2O_3 as a digestive marker. Laboratory analysis of digesta samples in not yet completed.

PUBLICATIONS OR REPORTS:

López-Soto, M.A., A. Plascencia, G.E. Arellano, and R.A. Zinn. 2000. Interaction of maceration and fibrolytic enzyme supplementation on the site and extent of digestion in rice straw in holstein cows. Proc. West. Sect. Am. Soc. Anim. Sci. 51:458-462.

Torrentera, N., E. G. Alvarez, and R. A. Zinn. 2000. Influence of maceration on the feeding value of rice straw in growing-finishing diets for feedlot cattle. Proc. West. Sect. Am. Soc. Anim. Sci. 51: 496-499.

Ware, R. A., E. G. Alvarez, M. Machado, M. F. MontaZo, S. Rodriguez, and R. A. Zinn. 2002. Influence of pelletizing on the feeding value of rice straw in growing-finishing diets for feedlot cattle. Proc. West. Sect. Am. Soc. Anim. Sci. 53:637-641

Ware, R. A., N. Torrentera, and R. A. Zinn. 2005. Influence of Maceration and Fibrolytic Enzymes on the Feeding Value of Rice Straw. J. Anim. and Vet. Sci. Vol. 4(3): 387-392.

Ware, R. A., L. Corona, N. torrentera, and R. A. Zinn. 2005. Effect of pelletizing on the feeding value of rice straw in steam-flaked corn growing-finishing diets for feedlot cattle. Animal-Feed-Science-and-Technology.; 107: **In Press**

CONCISE GENERAL SUMMARY OF CURRENT YEAR=S RESULTS:

One hundred and twenty-five Holstein steers were used in a 188-d trial to evaluate the synergy between maceration and the use of a surfactant (Tween 80) on the feeding value of rice straw. Treatments consisted of a steam-flaked corn-based diet containing 15% forage (DM basis) as follows: 1) sudangras hay; 2) ground rice straw; 3) ground rice straw plus 0.22% of tween 80; 4) macerated rice straw, and 5) macerated rice straw plus 0.22% of tween 80. All forages were ground to pass through a 2.6 cm screen prior to incorporation into complete mixed diets.There were no interactions between maceration and surfactant on growth-performance or carcass characteristics. Drymatter intake was similar ($P > 0.20$) across treatments, averaging 8.03 kg/d. However, maceration of rice straw increased carcass adjusted ADG (6%, $P < 0.10$), gain efficiency (6%, $P < 0.05$), and dietary NE (5%, $P < 0.05$) compared with grinding, alone. Given that the NEm and NEg of sudangrass hay are 1.18 and .62 Mcal/k, respectively (NRC, 2000), then the corresponding NEm and Neg values are 0.61 and 0.04 respectively for ground rice straw, and 1.25 and 0.61 for macerated rice straw, respectively. Compared with grinding, alone, macerated rice straw supplemented diets increased ($P < 0.05$) carcass weight (3.2%),

dressing percentage (1.7%) and quality grade (4.01 vs 4.29). We concluded that the maceration increasing the feed value of rice straw to a level similar to that of good-quality (harvested at the flag stage of maturity) sudangrass hay.

Table 1. Treatments effects on growth performance responses in feedlot cattle (Trial 1)

		Rice straw[a]				
Item	Sudangrass	Grd	Grd + T	Mac	Mac +T	SEM
Days on test	189	187	187	187	190	
Pen replicates						
Live weight, Kg[b]						
Initial	292.8	290.9	291.5	290.2	292.8	.69
Final[c]	551.4	533.8	536.4	550.5	55.4	6.9
Weight gain, kg/d [de]	1.37	1.30	1.31	1.39	1.38	.04
DM intake, kg/d	7.99	8.07	7.93	7.99	8.15	.15
DM intake/gain[c]	5.82	6.24	6.05	5.74	5.88	.13
Diet energy, Mcal/kg						
Maintenence[c]	2.24	2.13	2.18	2.26	2.23	.03
Gain[c]	1.56	1.46	1.50	1.57	1.55	.03
Observed/expected diet NE						
Maintenence[c]	1.01	.99	1.01	1.05	1.04	.02
Gain[c]	1.02	.99	1.02	1.07	1.05	.02

[a] Grd=ground rice straw, Mac= macerated rice straw, T = tween 80, 0.22%.
[b] Initial and Carcass adjusted final weight reduced 4% to account for fill.
[c] Ground *vs* macerated straw (P<0.05).
[d] Ground *vs* macerated straw (P<0.10).
[e] Carcass adjusted gain.

Table 2. Treatments effects on carcass characteristica in feedlot cattle (Trial 1)

		Rice straw[a]				
Item	Sudangrass	Grd	Grd + T	Mac	Mac +T	SEM
Carcass weight, kg [b]	356.2	344.8	346.5	355.6	358.8	4.5
Dressing percentaje [b]	64.56	63.98	64.13	64.79	65.54	.46
Rib eye area, cm	81.9	87.1	85.4	88	84.1	2.72
Fat thickness, cm	.79	.73	.52	.70	.82	.09
KPH, %	2.49	2.51	2.44	2.47	2.53	.09
Quality grade [b]	4.38	3.88	4.14	4.28	4.30	.19
Retail yield, %	51.65	52.63	52.86	52.57	51.79	.40

[a] Grd=ground rice straw, Mac= macerated rice straw, T = 0.22% of Tween 80, air dry basis.
[b] Ground *vs* macerated straw (P<0.05).
[c] Coded: minimum slight = 3, minimum small = 4, etc.