FATS AND PROTEINS RESEARCH FOUNDATION, INC.

Director's Digest

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Improving Tallow-Urea Compatibility in Ruminant Rations

Urea is widely used as a supplementary nitrogen source in ruminant feedlot rations. In areas where plant or animal proteins are expensive the use of urea has resulted in reduced production costs. Tallow is also used in feedlot rations in order to increase caloric density, control dust, increase palatibility and improve feed efficiency. However, some studies have indicated that certain combinations of tallow and urea result in unfavorable effects upon animal performance.

A recent FPRF-supported study reported in the proceedings of the Western Section of the American Society of Animal Science by Professor D. C. Church and coworkers at Oregon State University indicates that protein-protected tallow can be successfully fed with urea in ruminant rations, thus overcoming the apparent incompatibility of tallow-urea mixtures.

Their experimental procedure entailed four digestion trials using twelve sheep per trial. Each trial consisted of one control and two test diets (Table I). Total composition of nutrient intake and resultant waste material was carefully assayed. The protected tallow, originally developed in the Australian C.S.I.R.O. laboratories, was prepared by emulsifying tallow and casein (4:1) and then treating with formaldehyde. This product was then mixed with rolled barley and oven-dried. Protected protein was prepared by spraying formaldehyde on casein before adding to the diet.

The first feeding trial (Trial A) was designed to determine if any negative effects on digestibility would result from a tallow and soybean meal (SBM) combination. The results indicate that, on the contrary, fat digestibility is significantly increased from 62 to 92% (Table II).

In Trial B, feeding urea plus tallow gave not unexpected decreases in all digestibility coefficients; nitrogen retention and biological value as compared to the basal diet. Feeding urea plus protected tallow resulted in significant increases in digestible energy, crude protein and nitrogen retention. Further comparison of the protected tallow with the basal diet alone shows decreases in ash and fiber but also significant increases in such parameters as fat and nitrogen retention, as well as marked improvement in biological value. Thus, feeding protected tallow with urea overcomes most of the antagonistic effects of feeding tallow and urea, in addition to improving fat utilization over the basal diet alone.

Table I COMPOSITIONS OF RATIONS

Treatment	Alfalfa	Beet Pulp	Barley rolled'	Straw	Molasses	SBM	Lime-stone	Urea	Tallow	Casein
Trial A										
Basal + SBM	6.59	11.53	61.80	--	4.16	14.93	.99	--	--	--
Basal + urea	5.93	11.63	74.78	--	4.94	--	.99	1.73	--	--
Basal + SBM + tallow	6.28	10.98	58.88	--	3.96	14.23	.95	--	4.72	--
Trial B										
Basal + SBM	6.59	11.53	61.80	--	4.16	14.93	.99	--	--	--
Basal + urea + tallow	5.65	11.08	71.25	--	4.71	--	.95	1.65	4.71	--
Basal + urea + protected tallow	5.53	10.84	69.73	--	4.61	--	.92	1.61	5.40	1.36

Table II APPARENT DIGESTIBILITY COEFFICIENTS, NITROGEN RETENTION AND BIOLOGICAL VALUES

Treatment	Dry matter, %	Ash, %	Acid detergent fiber, %	Fat, %	Digestible energy, %	Crude protein %	Nitrogen retention g	Biological value
Trial A								
Basal + SBM	82.62	52.17	61.61[a]	62.37[a]	82.13	83.05	58.97	38.61
Basal + urea	81.14	44.73	53.32[b]	68.27[a]	80.59	83.72	63.75	41.29
Basal + SBM + tallow	84.81	47.87	65.86[a]	92.37[b]	85.22	84.76	62.15	44.50
Trial B								
Basal + SBM	84.69[a]	41.68[a]	59.22[a]	49.92[a]	83.59[a]	81.55[a]	23.09[a]	20.49
Basal + urea + tallow	79.12[b]	22.22[b]	17.53[b]	85.78[b]	75.83[b]	75.19[b]	7.92[a]	8.90
Basal + urea + protected tallow	81.63	22.37[b]	31.18[b]	88.68[b]	80.12[a]	84.90[a]	55.58[b]	34.77

[a,b]Significantly different within each trial ($P < .05$)