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Soybean Meal and Urea Supplements with Corn Silage
at Various Stages of Feeding for Growing Cattle

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Calves weaned and fed supplements containing urea generally have a period of reduced performance in comparison to those fed soybean meal supplements. The period of reduced gains may last for 3 to 4 weeks for calves unadapted to urea, but it may vary in length and severity depending upon the level of urea, energy concentration of the diet, age of cattle and stresses to which subjected prior to arrival and at the feedlot. The period of reduced performance appears to become of lesser importance with increasing age of the cattle.

There is some evidence that the effects from adaptation to urea may be partially offset by gradual increases in urea over a period of about 1 month starting at relatively low levels. Feeding soybean meal to calves as the major supplemental protein for about 1 month before introducing urea has been reported to be beneficial in overcoming the period of reduced performance from adaptation to urea.

Under investigation in this experiment were the comparative values of soybean meal, urea and a combination of the two during the first month of feedlot adaptation of calves. Also tested were the effects of changes in the source of supplemental protein after 1 month in the feedlot.

Procedures

The steers used in the experiment were purchased about mid-January. They were fed about 5 lb. of alfalfa-bromegrass hay and a full feed of corn silage for about 3 weeks prior to starting the experiment.

One hundred forty-four steer calves (72 Hereford x Angus and 72 Hereford) were allotted into 24 pens of 6 each (3 of each breed group) for six supplement treatments. One of the four pens within each supplement group was implanted with 36 mg diethylstilbestrol, 36 mg zeranol, Synovex-S or served as the implant control. Allotment was at random to the 24 pens within weight groups of 24 after stratifying on basis of weight.

The dietary treatment during the first month of feedlot adaptation was a full feed of corn silage supplemented with soybean meal, urea or a combination of soybean meal and urea. Eight pens of calves were fed 2 lb. per head daily of the soybean meal supplement, eight pens fed the same level of the urea supplement and the other eight pens of calves were fed 1 lb. per head daily of each supplement.

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The supplements were formulated to contain 32% protein. They were fortified with minerals, vitamin A and chlortetracycline-sulfamethazine. Ingredient composition is shown in table 1.

Table 1. Ingredient Composition of Protein Supplements
(Feedlot Adaptation Phase)

Ingredient	SBOM suppl.	Urea suppl.
	%	%
Ground corn grain	22.54	78.81
Soybean meal (44%)	67.65	
Urea (46% N)		9.30
TM salt	4.00	4.00
Limestone	2.20	
Dicalcium phosphate	3.00	4.50
Calcium sulfate (1 pt. S to 10 pt. N from urea)		2.58
TM premix		0.20
Vitamin A (30,000 IU/g) (15,000 IU/lb. suppl.)	0.11	0.11
Aureo S-700 (175 mg each of CTC and SMZ/lb. suppl.)	0.50	0.50

Following the first month of feedlot adaptation, four pens of calves from each supplement treatment group were fed soybean meal and the other four were fed the urea supplement for an additional period of 63 days (93 days for the entire experiment). The calves were not reallocated for this phase of the experiment. Initial designation of implant treatments was such that implant treatments were balanced within supplement groups.

Diets during this phase of the experiment were corn silage full-fed with 2 lb. of protein supplement. The protein supplements were as for the initial phase except vitamin A was reduced to 10,000 IU per lb. of supplement and chlortetracycline at 35 mg per lb. of supplement replaced the chlortetracycline-sulfamethazine mixture. Feeding was once daily in outside paved pens without access to shade or shelter.

Results

Results of the experiment after 30 days on basis of weights taken in early morning before feeding are shown in table 2. Steers fed corn silage supplemented with soybean meal gained at the fastest rate and 0.37 lb. more daily than those fed the urea supplement. Feeding the combination of soybean meal and urea offered no improvement over urea alone during this time of the experiment. Feed consumed was similar for each supplement group of cattle during the initial 30 days. Those making the faster rate of gain had lower feed requirements.

Table 2. Soybean Meal and Urea Supplements with Corn Silage
at Various Stages in the Feeding Period
(Day 1 to 30)

	Type of protein supplement		
	SBOM	Urea	SBOM-urea
No. of animals	47 ^a	48	48
Initial filled wt., lb.	546.0	546.4	544.4
Filled wt., lb. (30 days)	617.4	606.8	602.4
Avg. daily gain, lb.	2.39	2.02	1.94
Avg. daily feed, lb.	25.99	25.76	25.85
Feed/100 lb. gain, lb.	1106	1286	1349

^aOne steer died. Results are presented for those finishing the experiment.

Results for the second month of the experiment following the changes in supplements are presented in table 3. There were only small differences in rate of gain between steers fed soybean meal for both months, those changed from urea to soybean meal, changed from the combination to soybean meal or changed from the combination to urea. In all cases, rates of gain were improved over the first month.

Table 3. Soybean Meal and Urea Supplements with Corn Silage
at Various Stages in the Feeding Period
(Day 31 to 58)

	Type of protein supplement					
	Day 1 to 30		Day 31 to 58		SBOM-urea	SBOM-urea
	SBOM	SBOM	Urea	Urea	SBOM	Urea
No. of animals	24	23 ^a	24	24	24	24
Filled wt., lb. (30 days)	621.3	613.6	611.7	601.9	599.8	609.1
Filled wt., lb. (58 days)	695.2	680.4	682.9	661.5	672.6	678.7
Avg. daily gain, lb.	2.64	2.31	2.55	2.13	2.60	2.63
Accumulative daily gain, to date, lb.	2.54	2.30	2.29	2.05	2.25	2.28
Avg. daily feed, lb.	35.55	34.58	33.33	34.78	33.47	34.83
Feed/100 lb. gain, lb.	1346	1456	1319	1635	1293	1413

^aOne steer died. Results are presented for those finishing the experiment.

Steers fed urea for the first time gained at a lower rate (0.33 lb. daily) than those continued on soybean meal. The reduction in this case was of about the same amount as between soybean meal and urea during the first month.

Steers continued on urea gained only slightly more the second month than during the first one. Their rate of gain was considerably less (0.42 lb. daily) than for steers changed from urea to soybean meal after 1 month of the experiment. They also gained at a slightly lower rate than steers fed soybean meal and switched to urea after 1 month.

Average daily gains after 2 months were about the same for steers fed various combinations of soybean meal and urea. Those fed soybean meal both months gained about one-fourth pound more daily and those fed urea both months gained about this much less. Type of supplement appeared to have only a small effect on feed consumption as was true during the first month.

The supply of corn silage was fed up after 93 days. The cattle were weighed following an overnight stand without feed and water and the experiment terminated. Results for the 93 days on basis of shrunk weights are presented in table 4.

Table 4. Soybean Meal and Urea Supplements with Corn Silage at Various Stages in the Feeding Period (Feb. 6 to May 10--93 days)

Adaptation phase Growing phase	Type of protein supplement					
	SBOM		Urea		SBOM and urea	
	SBOM	Urea	SBOM	Urea	SBOM	Urea
No. of animals	24	23 ^a	24	24	24	24
Initial shrunk wt., lb.	525.3	527.0	526.3	523.7	524.5	526.3
Final shrunk wt., lb.	757.3	736.6	740.2	723.5	736.2	740.8
Avg. daily gain, lb.	2.50	2.25	2.30	2.15	2.28	2.31
Avg. daily feed, lb.	35.33	35.17	34.00	35.07	34.13	35.43
Feed/100 lb. gain, lb.	1419	1572	1484	1635	1501	1541

^aOne steer died. Results are presented for those finishing the experiment.

Average daily gain after 93 days differed only slightly from the accumulative gains after 2 months except for some improvement for steers fed urea during the entire experiment. The advantage for soybean meal supplement appeared to result largely from the better performance of this group during the first month in the feedlot. The depressing effect of urea was similar whether fed upon arrival or after 1 month when the calves were on full feed. When urea was fed as the major supplemental protein, rate of gain was not equal to that of calves receiving other treatments until after about 2 months.

Supplement treatments appeared to have only small effects on feed consumption. Calves making the faster rates of gain had lower feed requirements.

Summary and Comments

Calves used in this experiment had been weaned and fed growing-type diets for about 3 months prior to purchase. They were fed corn silage and alfalfa-bromegrass hay without additional supplemental protein for 2 to 3 weeks prior to the experiment.

Those full-fed corn silage and soybean meal gained at the fastest rate (2.39 lb. daily) during the first month of the experiment. Feeding urea as the major supplemental protein resulted in lower (0.37 lb. daily) rates of gain. A combination of soybean meal and urea resulted in no improvement over urea alone during this time.

Changing the supplement from soybean meal to urea after 1 month resulted in a reduction in rate of gain in comparison to soybean meal of about the same amount (0.33 lb. daily) as during the first month of the experiment. Calves changed from the urea supplement to soybean meal or from the combination of soybean meal and urea to either soybean meal or urea gained at about the same rate during the second month of the experiment as those fed soybean meal from the beginning.

Calves fed urea from the beginning of the experiment continued to gain at a lower rate during the second month of the experiment. Thereafter, there was some compensatory gain for this group, resulting in a narrowing of the differences in weight gain in comparison to other groups at the end of the 93-day experiment.

Results of the experiment show that calves unadapted to urea may gain at a lower rate when fed urea in comparison to soybean meal with a full feed of corn silage. It appeared to make little difference whether the urea was offered at the beginning of the feeding period or 1 month later when on full feed. Any decision to delay feeding of urea for about 1 month should depend upon condition and health of the calves since a later date might be at a more favorable time as to general thrift and health of the animals.

A combination of soybean meal and urea appeared to offer no benefit over urea alone during the first month of feeding. After this first month, those fed urea gained as well as those fed soybean meal.

In general, there appeared to be little or no compensation for the reduction in performance upon introduction of urea to the diets except for those fed urea for the entire experiment and having a lower rate of gain during the first 2 months. In this case, the value of urea in comparison to soybean meal would likely depend to a large degree on the length of the feeding period. Any reduction in rate of gain for a period of a few weeks would be less important with increasing length of the feeding period.

Supplement treatments appeared to have little effect on feed consumption in this experiment. Therefore, calves making the faster rates of gain had lower feed requirements.