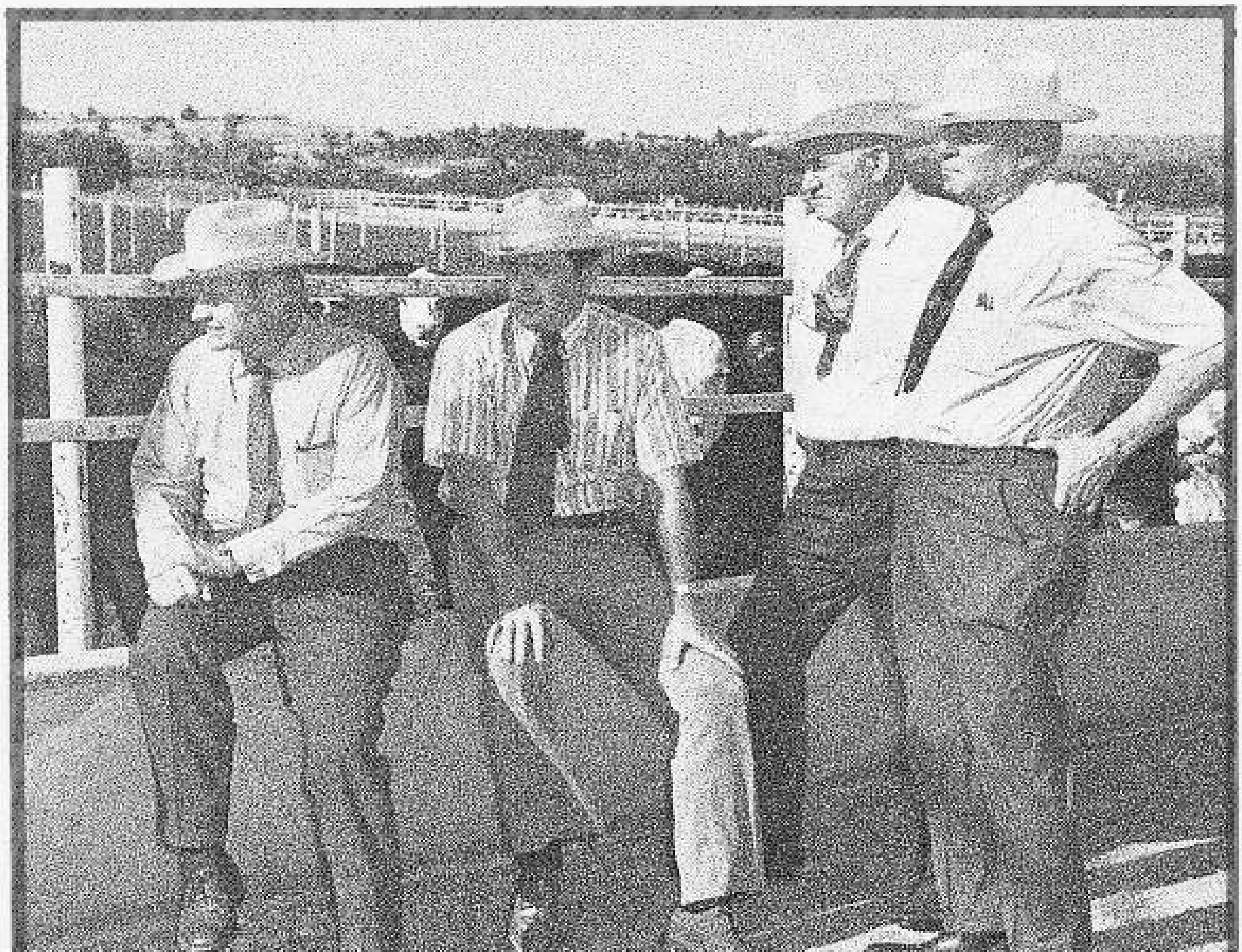
1974 CATTLEMAN'S DAY



Report of Progress 210 · Friday, March 1, 1974 · 61st Annual

Department of Animal Science & Industry · Weber Hall

Agricultural Experiment Station · Kansas State University, Manhattan
Floyd W. Smith, director

THE COVER - The Cattle Flow Project, Beef Cattle Research Center, Kansas State University, photographed by David R. Von Riesen.

From the left are Don L. Good, head, Department of Animal Science and Industry; Jack Riley, in charge, Beef Cattle Research Center; Ray Frisbie, director, Livestock and Meat Industry Council, Inc., Manhattan; Earl C. Brookover, president and chairman of executive committee, Livestock and Meat Industry Council, Inc.

The Beef Cattle Flow Project provides for year-long, applied research, using enough animals in each lot to simulate practical situations in commercial feedlots. The feeding trials are planned by staff members of the Department of Animal Science and Industry, the Department of Agricultural Economics, and the College of Veterinary Medicine.

This unique research enterprise was suggested by Earl C. Brookover, and facilities for it were expanded in 1973 with funds allocated through the Kansas Agricultural Experiment Station. Financing of ongoing operations is by the Livestock and Meat Industry Council, Inc. with the cooperation of the KSU Endowment Association and four Manhattan banks.

The Council is a nonprofit, educational and charitable corporation. Tax deductible funds solicited and received by the Council for animal and meat science research and related activities are pooled and deposited in the Livestock and Meat Industry Council Fund of the Kansas State University Endowment Association.

The Council's basic tenet is that private contributions should supplement, not replace, State and Federal funds in financing research and education for the livestock and meat industry. While serving as vice-president of the Council, Mr. Brookover endorsed this policy by saying:

"Because the livestock and meat industry is complex and growing rapidly, related agribusinesses as well as producers should supplement Federal and State funds for research and education to the point that it might seem to hurt a little at the moment. It's the best way we know to channel funds into research development that is pertinent to our industry."

Dr. Good summarized the Council's role when he said:

"The Council is adding a new dimension to animal and meat science research at Kansas State University. Tangible contributions, though considerably and urgently needed, are overshadowed by the meaningful relationships being established between industry leaders and staff members of the Department of Animal Science and Industry."

The Council's objective is to establish an endowment fund of at least $1.5 million, with income from the endowment allocated annually to help support animal and meat science research and related activities.

Additional information concerning the Council may be obtained from:

The Livestock and Meat Industry Council, Inc.
Weber Hall, Kansas State University
Manhattan, Kansas 66506

61st Annual
CATTLEMEN'S DAY
Friday, March 1, 1974

8:00 a.m. Weber Hall Arena
Registration--Exhibits
(Coffee and Donuts Served).

9:45 a.m. Williams Auditorium
Umberger Hall
Dr. Don L. Good, Head, Dept. of Animal Science & Industry, KSU presiding

Opening remarks
Dr. Keith Huston, Associate Director of Agricultural Experiment Station, KSU

Beef Cattle Research
Panel: Moderator, Dr. Bill Able, Dept. of Animal Science & Industry, KSU

Estrus Synchronization in Cattle, Dr. Guy Kiracofe, Dept. of Animal Science & Industry, KSU

Protein Requirements for Growing - Finishing Cattle
Dr. Jack Riley, Dept. of Animal Science & Industry, KSU

Influence of New Breeds on U.S. Beef Cattle Industry
Panel: Moderator, Dr. Dell Allen, Dept. of Animal Science & Industry, KSU

Viewpoint of Breed Associations
Dr. Jack Phillips, Chief Executive Officer, American Chianina Assoc., Kansas City, Mo.

Animal Breeders Viewpoint,
Dr. Larry Cundiff, USDA Meat Animal Research Center, Clay Center, Nebr.

Cow-Calf Viewpoint, Mr. Bob Dickinson, Rancher, Gorham, Kansas.

Feeders Viewpoint, Dr. Mike Dikeman, Dept. of Animal Science & Industry, KSU

12:30 p.m. Weber Hall
Lunch: Roast Beef

1:15 p.m. Weber Hall
Remarks
Mr. Claire Robinson, President, Kansas Livestock Association, Cedar Point, Kansas

Introduction of Guest Speaker
Dr. Don L. Good

To be announced

2:00 p.m. Beef Cattle Research Center (about 2 miles north, at end of College Avenue).

FOR THE LADIES

Thursday, February 28, 1974

6:30 p.m. Bluemont Room, KSU Union
Kansas Cow Belles Dinner
Reservations by February 27 to:
Mrs. Don L. Good
2027 Sunnymeade Road
Manhattan, Kansas 66502

Friday, March 1, 1974

9:30 a.m. Weber Hall, Staff Memorial Library. Coffee
11:00 Program, Weber Hall 107
Flower Arranging, Dr. Ed Odom, Dept. of Horticulture, KSU
12:30 Lunch: Roast Beef

STOCKMEN'S DINNER
Thursday, February 28, 1974

6:30 p.m. Manhattan Country Club.
Reservations by February 25 to:
Livestock & Meat & Industry Council, Inc.
Weber Hall, Kansas State University
Manhattan, Kansas 66506

CONTENTS

Beef Cattle Commercial Feedlot Studies[1,2]

The Livestock and Meat Industry Council initiated a program of purchasing a large group of steers to be used for experiments on topics related to the beef cattle feeding industry of Kansas. Objectives are to investigate aspects of commercial feedlot operations that are current, or potential, problems: such as nutrition, health, disease, internal and external parasites, shrinkage, transportation, marketing, management, pollution control, etc. Scientists in various disciplines submit subprojects specifying particular objective(s) and procedure (s).

Results of the first project were reported in the 60th Annual Report. A third project is in progress.

Results of the second project follow.

[1] Financial support was provided by the Livestock and Meat Industry Council, Inc. (LMIC)

[2] General Project co-ordinating committee includes
Dr. Ed. Smith, Chairman--Animal Science & Industry
Dr. Jack Riley--Animal Science & Industry
Dr. Don Good--Animal Science & Industry
Dr. Steve Armbruster--Animal Science & Industry
Dr. Ralph Lipper--Agricultural Engineering
Dr. Charles Pitts--Entomology
Dr. John McCoy--Agricultural Economics
Dr. Homer Caley--Veterinary Medicine
Dr. Russel Frey--Veterinary Medicine
Dr. Keith Huston--Agricultural Experiment Station

Contribution Nos. 462 and 1409, Departments of Animal Science and Industry and Agronomy, respectively, Kansas Agricultural Experiment Station, Manhattan 66506. 10M 1-28-74

Beef Cattle Commercial Feedlot Studies
Trial 2--Effects on Steer Performance of Variable Protein Levels, Implanting and Worming

J. G. Riley, K. F. Harrison, and D. L. Good

Summary

A 189-day trial used 280 mixed-breed steers to study effects of various protein levels in finishing steer rations. Rations containing 15.4 or 13.4% crude protein significantly improved rate of gain during the first 42 days compared with an 11.4% crude protein ration. Rates of gain after 91 or 189 days did not differ significantly indicating that steers make compensatory gains.

Removing supplemental protein from the ration of 140 steers the final 28 days did not adversely affect rate or efficiency of gain.

One hundred forty steers implanted with 36 mg. zeranol[1/] and 140 with 36 mg. stilbestrol[2/] gained similarly, however, Ralgro implanted steers graded significantly higher.

Steers wormed with levamisole[3/] or thiabendazole[4/] gained 0.06 pound per day faster than steers not wormed.

Introduction

Protein requirements for growing-finishing cattle published in the 1970 edition of "Nutrient Requirements of Beef Cattle" are generally accepted as the basis for ration formulation. However, dramatic increases in supplemental protein costs have generated numerous studies to more accurately define protein requirements at different stages of growth and development. Results reported by Kansas State, Ohio State, Texas Tech., and Kentucky in 1973 suggest that cattle on typical feedlot rations may require less crude protein than previously reported. The reduced requirement seems to be true after a certain time on feed or after attaining a specific weight.

1/ Marketed under tradename RALGRO, an exclusive product of Commercial Solvents Corporation, Terre Haute, Ind. RALGRO provided by Commercial Solvents Corporation.

2/ Marketed under tradename STIMPLANTS by Chas. Pfizer and Co., Inc., Terre Haute, Ind. STIMPLANTS provided by Chas. Pfizer and Co., Inc.

3/ Marketed under tradename Tramisol by American Cyanamid Co., Princeton, N. J. Tramisol provided by American Cyanamid Co.

4/ Marketed under tradename Thibenzole and TBZ by Merck and Co., Inc., Rahway, N. J. TBZ was provided for this trial by Merck and Co., Inc.

Stilbestrols (DES) removal from the market stimulated an interest in finding an acceptable, growth promoting alternative. Previous work at Kansas State has indicated that zeranol (RALGRO) implants can be as effective as DES implants. (KSU Bulletin 568, 1973).

Objectives of this trial were to provide additional data on protein levels, implants, and worming.

Experimental Procedure

Two hundred eighty mixed-breed steers averaging 603 lb. were randomly allotted to four pens of 70 steers each. Group 1 was fed a 15.4% crude protein (C.P.) ration for 42 days, 13.3% C.P. for 49 days, 11.3% C.P. for 70 days and 9.8% C.P. the final 28 days. Group 2 was fed a 13.3% C.P. ration for 91 days and 11.3 or 11.0% C.P. the remaining 98 days. Group 3 was fed an 11.3% ration for all but the final 28 days, then the protein supplement was removed so C.P. of the ration was 9.8%. Group 4 served as the control whose ration C.P. varied from 11.4-11.0% during the 189-day trial. Composition of the supplement is shown in table 1.1; of the complete rations, in table 1.2.

Protein supplement removed the final 28 days was replaced with rolled milo. No adjustment was made for variation in mineral contents between soybean oil meal and milo. Periodic samples of each ingredient used in the rations were taken and proximate analyses obtained. Average crude protein was calculated as shown in table 1.2.

An equal number of steers from each protein treatment group were wormed with Tramisol, Thibenzole, or served as nonwormed controls. In addition, 35 steers in each pen were implanted with 36 mg. of Ralgro, and 35 steers with 36 mg. of stilbestrol. Individual weights were taken at selected intervals and adjustments made in levels of crude protein fed. Carcass data were collected for each steer at the end of the trial. The study was from October 3, 1972 to April 10, 1973 (189 days).

Results and Discussion

Performance of the steers is presented in table 1.3. Feeding 15.4% or 13.4% crude protein rations the first 42 days significantly ($P<.01$) increased rate of gain compared with the 11.4% control ration. However, no significant differences in accumulative daily gain were obtained after 91, 161, or 189 days. Adverse weather and lot conditions severely affected performance of all cattle the final 90 days. The effect on steer performance of discontinuing protein supplementation during the final 28 days is shown in table 1.4. Rates of gain did not differ significantly. Daily feed intake was low and efficiency was poor for all groups, mostly because of extremely muddy lots, but the data indicate that supplemental protein can be withdrawn the final 28 days with no adverse effects. That agrees with trial 1 results from similar type and weight steers.

Steers implanted with Ralgro or with DES made similar gains but Ralgro produced carcasses that graded significantly ($P<.05$) higher. Ralgro was more beneficial the first 120 days indicating that re-implanting may be beneficial in longer feeding programs. Results (table 1.5) agree with previous findings here (KSU Bulletin 568, 1973).

Effects of worming on steer performance are shown in table 1.6. Tramisol and TBZ treated steers gained 0.06 lb. more per head per day than steers not wormed, a non significant difference.

Additional trials in progress are to determine more precisely optimum levels of crude protein at various stages of the feeding period. Emphasis is on increased (13%) crude protein when animals weigh less than 750 pounds and reduced (11% and lower) levels after they reach 750 pounds.

Table 1.1. Composition of Protein Supplement

Ingredient	%
Soybean oilmeal[a]	53.5
Rolled milo	15.8
Limestone	15.6
Salt	10.0
Urea[a]	3.2
Trace minerals (Z-5)[b]	1.0
Aureomycin (10 gms/lb.)	0.7
Vitamin A (30,000 I.U./gm)	.2

[a]Replaced by rolled milo to provide supplement for lots 1 and 3 the last 28 days of trial.

[b]Calcium Carbonate Co.

Table 1.2. Composition of Rations (%, dry matter basis)

Ingredient	15% C.P.	13% C.P.		11% C.P.					Basal
	0-42 days	0-42	43-91	0-42	43-91	92-140	141-161	162-189	162-189
Sorghum silage	20.0	20.0	20.0	20.0	20.0	20.0	15.0	15.0	15.0
Flaked milo	30.4	33.0	35.4	35.6	38.0	46.0	35.0	35.0	35.0
High moisture milo	30.4	33.0	35.4	35.6	38.0	---	---	---	---
Cracked corn	---	---	---	---	---	30.0	46.0	46.0	46.0
Supplement	3.8	3.8	4.0	3.8	4.0	4.0	4.0	4.0	4.0
Dehydrated alfalfa	5.0	5.0	---	5.0	---	---	---	---	---
SBOM	10.4	5.2	5.2	---	---	---	---	---	---
[a]Crude protein content, %	15.4	13.4	13.3	11.4	11.3	11.3	11.2	11.0	9.8

[a]Calculations based on periodic sampling of each ingredient during experiment.

Table 1.3. Feedlot Performance of Steers Fed Indicated Levels of Protein

Item	Days	% Crude protein (Dry matter basis)			
	0-42	15.4	13.4	11.4	11.4
	43-91	13.3	13.3	11.3	11.3
	92-161	11.3	11.3	11.3	11.3
	162-189	9.8	11.0	9.8	11.0
Lot number		1	2	3	4
Number of steers		69	70	70	70
Initial wt., lb.		603.0	602.1	602.3	603.6
Final wt., lb.		990.5	1002.8	986.0	989.2
Avg. total gain, lb.		387.5	400.7	383.7	385.6
Avg. daily gain, lb.					
0-42		3.15[a,b,d]	3.20[a,b]	2.75[c]	2.91[d]
0-91		2.70	2.65	2.58	2.61
0-161		2.31	2.33	2.18	2.25
0-189		2.05	2.12	2.03	2.04
Feed D.M./lb. gain, lb.					
0-42		5.51	5.69	5.98	5.93
0-91		6.53	6.65	6.61	6.77
0-161		7.32	7.32	7.79	7.66
0-189		8.21	7.87	8.29	8.10
Dressing percentage		63.47	63.25	63.19	63.97
USDA grade*		10.16[e]	10.18[e]	10.11[e]	9.61[f]

[a,b,c,d]Means in same row with different superscripts differ significantly (P<.01).

[e,f]Means in same row with different superscripts differ significantly (P<.05).

[g]Choice = 11, low choice = 10, high good = 9.

Table 1.4. Effect on Steer Performance of Withdrawing Protein Supplement Final 28 Days

Item	Lots 1 and 3 Basal 9.8% C.P.	Lots 2 and 4 11% C. P.
Number of steers	139	140
Avg. initial wt., lb.	964.4	971.4
Avg. final wt., lb.	988.2	996.0
Avg. total gain, lb.	23.80	24.6
Avg. daily gain, lb.	0.85	0.88
Avg. daily D.M., lb.	15.97	16.06
Feed D.M./gain, lb.	18.79	18.25

Table 1.5. Influence of Implants on Performance and Carcass Characteristics of Feedlot Steers (189 days)

	Implant	
Item	36 mg Ralgro	36 mg stilbestrol
Number of steers	139	140
Initial wt., lb.	602.83	602.75
Final wt., lb.	990.28	993.98
Total gain, lb.	387.45	391.23
Number of days	189	189
A.D.G., lb.	2.05	2.07
Dressing percentage	63.59	63.34
USDA grade[a]	10.2[b]	9.77[c]

[a]Choice = 11, low choice = 10, high good = 9.

[b,c]Significant (P<.05).

Table 1.6. Effect of Worming on Performance of Feedlot Steers (189 days)

Item	Tramisol	Thibenzole	No wormer
Number of steers	91	93	95
Initial wt., lb.	603.63	602.65	602.08
Final wt., lb.	996.75	995.77	983.86
Total gain, lb.	393.12	393.12	381.78
Number of days	189	189	189
A.D.G., lb.	2.08	2.08	2.02
Dressing percentage	63.61	63.38	63.42

Effects of Roughage and Protein Levels on Performance of Finishing Steers and Heifers

K. F. Harrison and J. G. Riley

Summary

A 142-day trial used 36 Angus steers and 63 mixed-breed heifers to study the effects of roughage and protein levels in beef cattle finishing rations.

Results from a 13% crude protein ration the first 70 days or a ration with supplemental protein removed the final 30 days did not differ significantly from results with an 11% crude protein ration.

Rations containing 10.0, 17.5 or 25.0% roughage (dry matter basis) made no significant difference in performances by steers or heifers.

Introduction

Costs of supplemental protein prompt research on its more efficient use by feedlot cattle. Additional information is needed on protein requirements at various stages of growth. This trial is a part of the research at Kansas State to determine effects of feeding higher levels of protein (13% C.P.) early in the finishing phase and withdrawing supplemental protein late in the feeding period.

Three roughage levels during finishing also were studied to determine if level of roughage affects rate or efficiency of gain and whether protein and roughage level are interrelated.

Experimental Procedure

Thirty-six Angus steers and 63 mixed-breed heifers were used. These compact, early maturing animals were not uniform in size or conformation. Average beginning weights were 621 pounds for steers; 547 pounds for heifers. Steers and heifers were randomly allotted to each of three treatments. Each group contained 12 steers and 21 heifers. Group 1 was fed a control ration of 11% crude protein for 142 days; group 2 an 11% crude protein ration for 112 days with the protein supplement withdrawn the final 30 days. Group 3 was fed a 13% crude protein ration for the first 70 days and 11% crude protein ration for final 72 days. Equal numbers of animals in each group were fed rations containing 10.0, 17.5, or 25.0% roughage on a dry basis. Composition of supplements is shown in table 2.1 and complete rations in table 2.2.

Additional soybean oil meal was used to formulate the 13% crude protein rations. To remove the protein supplement the final 30 days, we replaced soybean oil meal and urea with rolled milo, with no adjustment for mineral differences between soybean oil meal and milo. Each ration ingredient was sampled periodically and analyzed. Average crude protein was calculated as shown in table 2.2.

Results

Results of the 142-day trial (August 14, 1972-January 3, 1973) are shown in table 2.3 and 2.4. Final gains were lower than expected, but cold, wet weather, the second half of the feeding period and type of cattle may have been factors. Protein (table 2.3) or roughage levels used (table 2.4) did not significantly affect gains, efficiency or carcass grades of either steers or heifers, perhaps because of individual differences among animals and too few animals, especially steers.

Steers and heifers in group 3, fed a 13% crude protein ration 70 days, gained the fastest and most efficiently during the first 70 days: 3.43 lb. per day by steers and 2.97 lb. for heifers (table 2.3). That agrees with previous trials here showing improved performance from 13% crude protein the first half of the feeding program.

Steers with no supplemental protein the final 30 days gained 0.16 lb. per day less than the two groups on 11% rations. The slow gainers had been gaining consistently slower before supplement withdrawal, so the reduced performance likely was not related to protein level. Removing supplemental protein from heifer rations did not significantly affect gain. Extreme variations in efficiency within groups appeared to be unrelated to protein level.

Steers and heifers fed 10% roughage (dry matter basis) gained faster, more efficiently, and graded higher than those fed 17.5% or 25% roughage. However, the differences were small in most instances and not significant. This study was during fall and early winter. Additional trials are needed to determine optimum roughage levels for different seasons of the year.

Table 2.1. Composition of Protein Supplements

Ingredient	Steers %	Heifers %
Soybean oil meal[a]	53.50	45.35
Rolled milo	15.75	23.50
Limestone	15.65	15.65
Salt	10.00	10.00
Urea[a]	3.20	3.20
Trace mineral (Z-5)[b]	1.00	1.00
Aureomycin (10 gms/lb.)	0.75	0.75
Vitamin A (30,000 I.U./gm)	0.15	0.15
MGA	---	0.40

[a]Replaced by rolled milo the last 30 days of treatment 2.

[b]Calcium Carbonate Company.

Table 2.2. Composition of Rations (%, dry matter basis)

Ingredient	Crude Protein, % 11.0			13.0[a]			Basal[b]		
	Steers								
Sorghum silage	10.0	17.5	25.0	10.0	17.5	25.0	10.0	17.5	25.0
Rolled milo	84.4	78.4	70.6	81.0	72.8	64.4	86.1	78.9	71.5
Supplement	4.0	3.7	3.6	3.8	3.8	3.8	3.9	3.6	3.5
Soybean oil meal	---	0.4	0.8	5.2	5.9	6.8	---	---	---
Crude protein, %	11.2	11.2	11.2	13.0	13.0	13.0	9.7	9.7	9.7
	Heifers								
Sorghum silage	10.0	17.5	25.0	10.0	17.5	25.0	10.0	17.5	25.0
Rolled milo	86.0	77.9	70.0	80.4	72.2	64.0	85.7	78.4	70.9
Supplement	4.0	4.1	4.2	4.5	4.5	4.1	4.3	4.1	4.1
Soybean oil meal	---	0.5	0.8	5.1	5.8	6.9	---	---	---
Crude protein, %	11.0	11.0	11.0	13.0	13.0	13.0	9.9	9.9	9.9

[a]Ration contained approximately 13% C.P. for first 70 days and 11% C.P. for final 72 days.

[b]Ration contained approximately 11% C.P. for 112 days and no protein supplement for final 30 days.

Table 2.3. Feedlot Performances by Steers and Heifers fed Indicated Levels of Protein

Days	% Crude Protein (dry matter basis)					
0-70	11.2	11.0	11.2	11.0	13.0	13.0
71-112	11.2	11.0	11.2	11.0	11.2	11.0
113-142	11.2	11.0	9.7	9.9	11.2	11.0
Item	Steers	Heifers	Steers	Heifers	Steers	Heifers
Group No.	1	1	2	2	3	3
Number of animals	10[a]	19[b]	11[c]	20[d]	12	20[e]
Initial wt., lb.	609.	547.	621.	547.	633.	548.
Final wt., lb.	981.	858.	958.	871.	992.	883.
Avg. total gain, lb.	372.	311.	337.	324.	359.	335.
Avg. daily gain, lb.						
0-70 days	3.18	2.86	3.10	2.77	3.43	2.97
0-112 days	2.68	2.30	2.52	2.41	2.79	2.45
0-142 days	1.98	1.78	1.82	1.82	1.98	2.05
Feed D.M./lb. gain, lb.						
0-70 days	6.80	6.81	6.90	6.90	6.22	6.46
0-112 days	8.18	8.47	8.62	8.24	7.69	7.94
0-142 days	9.88	11.60	10.67	13.74	10.39	9.20
Dressing percentage[f]	59.99	59.63	58.56	59.74	60.38	60.63
USDA grade[g]	10.44	9.97	10.22	9.52	9.50	9.21

[a] One steer removed because of urinary calculi; another because of sickness.
[b] Two heifers removed.
[c] One steer died.
[d] One pregnant heifer removed.
[e] One heifer removed.
[f] Calculated from hot carcass wt.
[g] High good = 9; low choice = 10.

Table 2.4. Feedlot Performance of Steers and Heifers fed Rations Containing Indicated Roughage Levels (142 days)

	Roughage (%, dry matter basis)					
	10.0		17.5		25.0	
Item	Steers	Heifers	Steers	Heifers	Steers	Heifers
Number of animals	11[a]	19[c]	12	19[d]	10[b]	21
Initial wt., lb.	621.	547.	621.	546.	621.	547.
Final wt., lb.	991.	876.	960.	870.	979.	866.
Avg. total gain, lb.	370.	329.	339.	324.	358.	319.
Avg. daily gain, lb.	2.61	2.32	2.39	2.28	2.52	2.25
Feed D.M./lb. gain, lb.	8.15	8.30	8.98	8.54	8.35	8.56
Dressing percentage[e]	60.10	60.28	59.96	60.15	58.91	59.57
USDA grade[f]	10.5	9.7	9.5	9.7	10.2	9.3

[a]One steer removed because of urinary calculi.

[b]One steer died and one removed because of sickness.

[c]Two heifers removed.

[d]One pregnant heifer taken off test; another removed.

[e]Calculated from hot carcass weight.

[f]High good = 9, low choice = 10.

Influence of Rumen Fluid Innoculation on Incidence of Sickness in Newly Arrived Feeder Calves

J. G. Riley, K. K. Bolsen, S. Armbruster, H. Caley and G. Fink

Summary

Innoculating newly arrived feeder calves with 250 ml. rumen fluid did not stimulate weight gain or decrease sickness. One hundred seventy steer calves were used in the 31 day study.

Introduction

Innoculating or drenching with various products is being promoted as a beneficial stimulus for increased weight gain and reduced sickness in newly arrived feeder cattle, particularly light weight calves. Theoretically, if rumen fluid could be obtained from steers already adapted to the ration to be fed and put directly into rumens of the new arrivals, the rumen fluid may stimulate development of favorable rumen micro-organisms.

The objective of this trial was to evaluate the feasibility and effectiveness of innoculating newly arrived feeder calves with rumen fluid.

Experimental Procedure

Two groups of feeder steers totaling 170 head were purchased from Texarkana, Texas in late July, 1973. They were offered long hay and fresh water free choice 24 hours before being vaccinated for IBR, Leptospirosis, Blackleg and Malignant Edema. Steers with temperatures above 103.5°F were innoculated with either 250 ml. of freshly collected rumen fluid or 250 ml. of tap water. Data from steers with temperatures below 103.5°F were taken to judge losses due to high temperatures. The steers were weighed individually at the beginning and end of the test. Steers were assigned at random to pens of 8-10 each for close daily observation. Thereafter, all steers with temperatures above 103.5°F were treated with antibiotics and records were kept on the number of treatments per steer. All steers were fed a ration composed of sorghum silage, rolled milo and protein supplement.

Results and Discussion

The effect of rumen fluid innoculation on weight gain and incidence of sickness in newly arrived feeder calves is shown in table 3.1. Steers with initial temperatures below 103.5°F gained 5 lb. (36 lb. vs. 31 lbs.) more than either group with initial temperatures above 103.5°F. Steers innoculated with rumen fluid required the most antibiotic treatments during the 31 day trial.

Results indicate that innoculating with rumen fluid had no benefits.

Table 3.1. Effects of Rumen Fluid Innoculation on Weight Gain and Incidence of Sickness in Newly Arrived Feeder Steer Calves (31 days)

	No. Steers	Initial wt lb.	31-day Gain, lb.	% treated 2 or more times with antibiotics
Non-Innoculated	84	467.8	36	42
Rumen Fluid Innoculated, 250 ml.	45	456.2	31	47
Water Innoculated, 250 ml.	41	462.9	31	34

Effects on Cows, Calves, and Vegetation of Nitrogen Fertilization and Burning Bluestem Pastures Annually[1]

Loren L. Berger, C. E. Owensby, R. R. Schalles, L. H. Harbers, and E. F. Smith

Summary

Burning and fertilizing pastures were evaluated on six Bluestem pastures by comparing performances by spring-calving cows and calves. Two control pastures were not burned or fertilized, two pastures were burned, and two were burned and fertilized with 40 pounds of nitrogen an acre applied aerially. Average daily gains of the calves did not differ significantly among treatments. The burned, fertilized, pastures produced significantly higher gains per acre, as their increased forage supported heavier stocking rates.

Introduction

Number of cows has been increasing in the Flint Hills region and the trend is expected to continue with favorable feeder calf prices and fewer feeders grazed during summers. The increase has stimulated interest in more efficient range use. Weed control and fertilization have long been used to increase row crop production. Until recently little had been done to duplicate crop work with Bluestem range. We evaluated burning and fertilization as ways to increase the productivity of native grasses.

Experimental Procedure

Seventy-two Polled Hereford cows were assigned to three pasture treatments in the fall of 1971 with removal and replacements of cows that were unsound or failed to calf for two years. In the winter of 1972-73, the cows were supplemented with a ration of 53% milo, 30% wheat, 10% dehydrated alfalfa, and 7% soybean oil meal at 3-lb/hd/day from November 15 to January 31 and 5-lb/hd/day from February 1 to April 15. Calving was from February 18 through April 27. Polled Hereford bulls (1 per pasture) were placed in each pasture from May 24 to August 1, 1973.

All pasture treatments were the same as the previous year. April 24, four of the pastures were burned and two were not. May 2 ammonium nitrate (34% nitrogen) was applied aerially at 40 lbs. of nitrogen per acre. The year-around stocking rates were 5.6 acres per cow-calf on fertilized pastures, and 8 acres per cow-calf on burned and control pastures. Stocking rates, the same as the previous year, had been calculated from previous plot studies on herbage production under similar treatments.

[1]The following cooperated in making this study possible: Farmland Industries, Inc, Kansas City, MO; U. S. Steel Agri-Chemical Div., Kansas City, MO; and Bob's Flying Service, Waverly, KS.

The cows and calves were gathered and weighed the first week of every month, after being penned without feed and water over night. The calves from one pasture for each treatment had access to creep feed 30 days before weaning. Calves were weighed, graded, and weaned September 20.

Results and Discussion

Neither burning, nor burning and fertilizing combined, significantly affected average daily gain of calves (table 4.1). Pounds of beef produced per acre were significantly increased by burning and fertilizing through heavier stocking rates, not increased daily gains. Cow production factors did not differ significantly among treatments.

Table 4.1. Effects on Cows and Calves of Burning and Fertilizing Native Bluestem Pastures-1972-73

	Control		Burned		Burned and Fertilized	
Pasture number	1[1]	2	3[1]	4	5[1]	6
Acres in pasture	64	104	104	84	84	84
Cows per pasture	8	12	12	10	15	15
Acres per cow	8	8.5	8.5	8.4	5.6	5.6
Avg. wt. of cows 4 years or older Oct. 1,1973, that weaned calves[2]	1206	1023	1131	1054	1078	1079
Avg. calving date	4-14	3-15	3-18	3-13	3-21	3-11
No. of cows open	1	0	0	0	1	0
No. of calves born alive	6	12	11	8	15	15
No. of calves dead before weaning	1	1	2	2	2	1
Avg. wt. of calves born alive	80	77	77	76	79	77
% of cows 4 years and older weaning calves[2]	75	91	83	91	85	87
Avg. weaning wt.	423[1]	420	402[1]	413	413[1]	405
Adjusted weaning wt.	508[1]	453	444[1]	436	476[1]	445
Pounds weaned per acre	48	59	40	39	68	69

[1]Calves in pastures 1, 3, and 5 creep fed mixture of 60% dehydrated alfalfa and 40% ground milo last 30 days.

[2]Some two-year-old cows were added to some pastures to replace unsound cows in 1973.

Response of Yearling Steers on Bluestem Pastures That Were Intensively Stocked Early in Season[1]

Loren L. Berger, L. H. Harbers, R. R. Schalles, C. E. Owensby, E. F. Smith

Summary

Nine pastures of 492 acres were summer grazed by yearling steers. Five were burned April 24, 1973; four were not burned. Burned and nonburned pastures had 0, 40, or 80 lbs. of nitrogen per acre applied aerially. Stocking rates were determined with herbage production data from experimental plots under similar treatments. Under the same fertilization and stocking rates, average daily gain and gain per acre were higher for burned pastures than nonburned pastures. Fertilizing bluestem tended to reduce daily gains but increased gain per acre. Steers on the early-season, intensively grazed pasture, gained the most per day (1.51 lbs) and produced one of the higher per-acre gains (72 lbs.).

Introduction

Previous research has shown that forage production and quality of forage increased under nitrogen fertilization, however, cool-season grass and other undesirable species increased. Late-spring burning (April) under moderate stocking has increased steer gains as well as range condition. Burning effectively eliminates many cool season species, which increases the range's production potential. We are combining the two practices to see if they complement each other and to study effects on beef production and range condition. We also evaluated early-season-intensive stocking on a burned pasture.

Experimental Procedure

Nine native bluestem pastures, totaling 492 acres, 4 miles northwest of Manhattan were used in the study. All treatments were the same as the previous year. One nonburned, nonfertilized pasture, and one burned, nonfertilized pasture have had the same treatment the last 24 years-- to study long term effects. Burned pastures were burned April 24, and ammonium nitrate (34% nitrogen) was applied aerially May 2. The pastures grazed the entire summer season were stocked from May 3 to October 3, with mixed steers that averaged 487 lbs. The intensively grazed pasture was stocked from May 3 to July 15. The steers were sprayed for flies twice a month and had salt free choice. They were gathered the first of each month, penned overnight without feed or water, and weighed the next morning.

[1]The following cooperated in making this study possible: Farmland Industries, Kansas City, MO.; U. S. Steel Agri-Chemical Division, Kansas City, MO.; Farmers Co-op Assoc., Manhattan, KS.; Bob's Flying Service, Waverly, KS.

Results

Late spring burning increased daily gain and gain per acre (table 5.1). Nitrogen fertilization at 40 or 80 pounds per acre tended to reduce daily gain, but to increase gain per acre about 15-20 lbs. with little difference between the 40- and 80-pound rates. Highest daily gain was on the intensely stocked pasture (May 3 to July 15) twice normal rate early in the growing season rather than a moderate rate the entire season. Early intensive stocking has had no obvious detrimental effect on range conditions.

Table 5.1. Effects on Steer Gains of Burning and Fertilizing Native Bluestem Pasture, May 3 to October 3 (154 days)-1973

	Daily gain per steer, lbs.	Gain per acre, lbs.	Acres per steer
Not burned			
No nitrogen, same treatment 23 years	1.05	48	3.3
No nitrogen	.90	41	3.3
40 lb. nitrogen per acre	.80	54	2.2
80 lb. nitrogen per acre	.69	58	1.4
Burned April 24			
No nitrogen, same treatment 23 years	1.19	53	3.1
No nitrogen	1.06	48	3.3
40 lb. nitrogen per acre	.99	68	2.2
80 lb. nitrogen per acre	.84	70	1.4
Intensely stocked May 3 to July 15 (75 days)	1.51	72	1.7

Influence of Winter Nutrition on Production and Reproduction in Spring-Calving Cows

Duane Davis, R. R. Schalles, Guy Kiracofe and D. L. Good

Summary

Winter nutrition requirements for beef cows grazing native tallgrass range in the Flint Hills were studied from 1968 through 1973. Three lb. milo was a better supplement to the basic ration of 3 lb. alfalfa hay than 1 1/2 lb. of soybean meal was. Younger cows performed better when 6 lb. milo was fed with the 3 lb. alfalfa hay. Feeding 3 lb. alfalfa hay or the equivalent until approximately 100 days before the breeding season and 3 lb. alfalfa hay, 6 lb. milo the remainder of the winter did not reduce performance of cows 3 years old or older. Cows that rebred lost less weight over winter and were heavier the next summer when they were bred than cows that did not rebreed.

Introduction

Under most management systems, dry pregnant cows are expected to use considerable cheap, low quality roughage such as dormant winter grass. It is often necessary to supplement the grass to obtain optimum production and reproduction. More supplemental feed than necessary increases cost more than the returns. The objective of this study was to determine minimum feeding which will still obtain satisfactory production and reproduction.

Experimental Procedure

Various levels of energy and protein supplementation were studied during six years. The ten rations fed are given in table 6.1. Ration 1 was fed all years, each of the other rations was fed two consecutive years. Spring-calving Polled Hereford and commercial Hereford cows were allotted randomly by age to winter rations at the beginning of each two-year period. Supplemental feeding was from approximately November 1 to April 20. Breeding was predominantly by natural mating during a 65 day breeding season starting about May 25. Cows grazed year around on native pasture of big and little bluestem, Indian grass and switch grass.

Results and Discussion

Earlier conception and generally higher conception rate for cows fed high energy rather than high protein (ration 1 vs. 3 and ration 6 vs. 2) indicates the importance of energy in reproduction. Higher energy was most beneficial for 2 and 3 year old cows; 3 lb. alfalfa hay (ration 4) did not provide sufficient energy for mature cows as they conceived later than cows getting more energy.

Young cows fed 3 lb. alfalfa and 6 lb. milo (ration 6) had the best reproductive performance however, older cows fed 3 lb. alfalfa and 3 lb. milo performed as well. This indicates the difference in energy requirements due to age and justifies the separation of cows by age for supplementation.

Delaying a part of the winter feed until after calving (ration 7 vs. 1) delayed conception, especially among younger cows; however, delaying a part of the feed until February 10 (approximately 100 days before the start of the breeding season) did not alter rebreeding.

Concentrate mixtures tended to increase cow weights and improve reproduction when compared to the alfalfa hay-milo rations they were intended to approximate (ration 5 and 9 vs. 1 and ration 10 vs. 8). Because concentrate rations contained less bulk, cows on those rations may have grazed more dormant native grass and had greater total intake than cows on bulkier rations.

Calf weaning weights, in general, increased as winter feed provided the dams increased. Heavier calf weaning weights from cows fed the grain-soybean meal mixture than those fed similar alfalfa-milo rations indicate that concentrate rations are superior. However the milo-urea mixture (ration 5) did not follow that trend. Delaying a part of the ration did not adversely affect weaning weights for concentrate rations; however, delaying a part of the alfalfa hay-milo ration decreased weaning weight.

Table 16.1. Rations

Ration	Soybean meal	Milo	Alfalfa hay	Mix[1]
	Feed Ingredients (lb.)			
1	---	3	3	---
2	1½	3	3	---
3	1½	---	3	---
4	---	---	3	---
5	---	---	---	5
6	---	6	3	---
7	---	6 after calving	3	---
8	---	6 after Feb. 10	3	---
9	---	---	---	5
10	---	---	---	3 before Feb. 10 7 after Feb. 10

[1]Mix in table 6.2.

Table 6.2. Mixes Fed in Rations 5, 9 and 10

Feeds	Ration 5 mix		Ration 9 and 10 mix
	Year 1	Year 2	
	%	%	%
Soybean meal	---	---	7.0
Wheat	---	15.0	30.0
Milo	85.5	70.5	53.0
Dehy. alfalfa	9.5	---	10.0
Alfalfa hay	---	9.5	---
Urea	1.0	1.0	---
Limestone	2.0	2.0	---
Molasses	2.0	2.0	---

Table 6.3. Least Square Mean Conception Dates And Rates And Cow Weights by Ration and Age

	RATIONS[1]									
Traits	1	2	3	4	5	6	7	8	9	10
2 year olds (no.)	20	11	9	12	10	10	8	0	0	0
Dec. wt. (lb.)	889	897	893	873	891	913	875			
Feb. wt. (lb.)	862	891	851	851	862	880	862	---	---	---
May wt. (lb.)	783	829	796	803	807	825	794	---	---	---
Sept. wt. (lb.)	970	972	961	933	986	983	959	---	---	---
conception date	Jun 21	Jun 18	Jul 3	Jul 10	Jun 23	Jun 9	Jun 30	---	---	---
conception (%)	83	87	80	56	100	100	81	---	---	---
3 year olds (no.)	33	13	8	10	12	8	7	9	9	9
Dec. wt. (lb.)	944	948	926	908	942	968	942	908	959	922
Feb. wt. (lb.)	904	944	906	889	915	931	906	889	902	889
May wt. (lb.)	860	891	873	858	873	884	860	856	873	856
Sept. wt. (lb.)	1041	1063	1036	1023	1076	1076	1041	1021	1036	1032
conception date	Jun 16	Jun 20	Jun 29	Jul 10	Jun 6	Jun 2	Jun 23	Jun 24	Jul 1	Jun 4
conception (%)	93	88	98	99	85	100	88	100	88	100
4 years & older (no.)	60	8	15	9	26	25	23	25	25	28
Dec. wt. (lb.)	970	1010	972	955	981	994	972	955	968	953
Feb. wt. (lb.)	950	955	933	915	950	977	950	917	966	928
May wt. (lb.)	897	919	891	880	933	931	897	877	891	889
Sept. wt. (lb.)	1067	1100	1080	1067	1083	1091	1069	1065	1083	1065
conception date	Jun 13	Jun 9	Jun 14	Jun 27	Jun 9	Jun 10	Jun 14	Jun 8	Jun 9	Jun 10
conception (%)	99	93	100	100	100	94	96	91	94	88

[1]Rations given in table 1.

Soybean Meal and Starea (R) Blocks Compared by Wintering Cows on Bluestem Pasture: Effects on Birth and Weaning Weights of Calves

L. H. Harbers, E. L. Shiawoya, K. Conway, and R. M. McKee

Summary

Similar gains and adjusted weaning weights can be expected from calves whose dams are wintered on soybean meal or Starea portein blocks. Rebreeding time is expected to be similar for both groups of dams.

Introduction

During the winter of 1972-73, 52 pregnant beef cows (Hereford and Angus) from 3 to 14 years old (average 5 years) were divided into two groups to compare soybean meal and Starea blocks during gestation (KAES Bulletin 568, 1972, p. 15). Summarized here are data collected on the growth performance of calves and the time cows rebred the next spring and summer.

Methods

Estimates of adjusted 205-day weaning weights and rate of gain by calves were obtained from calf weights at weaning. Breeding dates were calculated from palpation estimates during September.

Results

Average daily gains and adjusted weaning weights (steer equivalent) were similar for both groups (table 7.1). The average rebreeding date was the same for cows fed soybean meal or Starea.

Table 7.1. Rebreeding Dates of Cows and Performance of Calves Born to Cows Receiving Soybean Meal or Starea Blocks During Gestation

Item	Soybean meal block	Starea block
Calf weaning wt., lb.	500 (401-644)[a]	528 (436-627)
Calf daily gain, lb.	2.23 (1.66-3.19)	2.34 (1.98-2.81)
Rebreeding day of year	157.6 (June 6)	157.1 (June 6)

[a]Average (range).

Protein Supplements for Feedlot Rations Compared

E. L. Shiawoya, L. H. Harbers, K. K. Bolsen,
J. G. Riley, and M. E. Dikeman

Summary

Protein supplements composed of either soybean meal, a combination of soybean meal and urea, or milo Starea improved gain 5% and feed efficiency 4% over supplements of either urea or wheat Starea (P<.25). Cost of gain favored the nonprotein nitrogen compounds; thus, choice of supplement was related to relative cost of supplements.

Introduction

The high cost of natural protein supplements makes less expensive, nonprotein nitrogen products attractive for finishing feedlot-cattle. Previous research has indicated reduced gains when compounds like urea are substituted for soybean meal; however, cost of gains may still favor the nonprotein nitrogen. Further savings are shown by data presented in another article in this publication suggesting no protein supplement after feedlot-cattle reach 950 lbs.

In this study we (1) compared substituting urea nitrogen for 50% and 100% of the nitrogen from soybean meal and (2) two Starea products (one composed of milo and one of wheat) with soybean meal and urea.

Materials and Methods

We divided 155 Angus steers (averaging 620 lbs.) equally into five groups. The 21 in each group were subdivided into three pens. Each pen received one of the following protein supplements: (1) soybean meal; (2) soybean meal-urea; (3) urea; (4) milo Starea; and (5) wheat Starea. Corn silage and rolled milo were the other major ingredients. Rations and protein supplements are summarized in table 8.1.

The cattle were fed 168 days to an average slaughter weight of 960 lbs. Carcass information was obtained through the cooperation of Wilson Packing Company, Kansas City.

Results

Results are summarized in table 8.2. Average daily gains for soybean-fed cattle, soybean-urea, and milo Starea, were similar. Cattle fed urea and wheat Starea tended to gain less (1.9 lb/day) but not significantly less (at the 25% level of probability). Feed efficiency trends were similar to daily gains.

The only difference in carcass characteristics was a lower percentage of kidney knob in steers fed a soybean meal-urea supplement.

Cost of gain was lower whenever soybean meal could be reduced or eliminated, so choice of protein supplement is closely associated with cost of gain and marketing time. Prices used (shown below, table 8.2) give lower cost gains from urea rations even though steers getting soybean meal gained 7% more. Identical prices were used for urea and Starea.

Table 8.1. Composition Percentages (dry matter basis) of Rations (Trial 1)

Nitrogen source	SBM[a]	SBM-Urea	Urea	MS-70[b]	WS-70[c]
Crude protein content of ration, %	11.6	11.6	11.6	11.6	11.6
Ration composition, dry weight basis, %					
Oct. 19 to Nov. 15, 1972					
Corn silage	23.2	21.7	21.7	21.7	21.7
Rolled milo	69.7	73.3	73.3	73.3	73.3
Protein supplement	7.1	5.0	5.0	5.0	5.0
Nov. 16, 1972 to Feb. 26, 1973					
Corn silage	20.1	20.1	20.1	20.1	20.1
Rolled milo	72.5	72.5	72.5	72.5	72.5
Protein supplement	7.4	7.4	7.4	7.4	7.4
Feb. 27 to Apr. 4, 1973					
Corn silage	13.5	13.5	13.5	13.5	13.5
Rolled milo	38.0	38.0	38.0	38.0	38.0
Corn	40.6	40.6	40.6	40.6	40.6
Protein supplement	7.9	7.9	7.9	7.9	7.9
Crude protein content of supplement, %	32.4	32.8	32.6	32.5	32.5
Supplemental protein, % of ration crude protein	20.7	20.9	20.8	20.7	20.7
Supplement composition, %:					
Soybean meal (44% CP)	73.7	33.4	----	----	----
Urea (281% CP)	----	5.2	9.2	----	----
Milo Starea-70	----	----	----	42.0	----
Wheat Starea-70	----	----	----	----	42.0
Ground milo	----	31.9	60.9	28.1	28.1
Limestone	15.4	14.8	15.2	15.2	15.2
Dicalcium phosphate	----	3.0	3.0	3.0	3.0
Salt	9.2	10.0	10.0	10.0	10.0
Zinc-5	1.0	1.0	1.0	1.0	1.0
Vitamin A	0.2	0.2	0.2	0.2	0.2
Aureofac 10	0.5	0.5	0.5	0.5	0.5
Total	100.0	100.0	100.0	100.0	100.0

[a]SBM = Soybean meal.

[b]MS-70 = Milo Starea-70 percent protein equivalent.

[c]WS-70 = Wheat Starea-70 percent protein equivalent.

Table 8.2. Feedlot Performances and Carcass Traits of Steers Fed Indicated Supplements

Nitrogen source	SBM	SBM-Urea	Urea	MS-70	WS-70
Feedlot data					
No. of steers	20	20	19	21	20
Initial wt., lbs.	624	615	618	625	620
Final wt., lbs.	978	965	946	968	946
Daily gain, lbs.	2.1	2.1	1.9	2.1	1.9
Feed/gain	9.5	9.9	10.1	9.5	10.0
Feed cost/100 lbs. gain[1]	$20.13	$19.45	$18.23	$17.77	$18.89
Carcass data					
Carcass wt., lbs.	590	583	558	584	570
Rib eye area, sq. cm.	72	68	70	74	74
Kidney knob, %	3.5[a]	2.8[b]	3.3[a]	3.4[a]	3.3[a]
Maturity score[2]	2.0	1.9	2.3	2.3	2.0
Marbling score[3]	16.7	15.3	17.1	16.6	16.1
Yield grade[4]	3.1	3.1	3.0	2.8	2.6

[1]Feed costs based on $/ton: milo, $38.80; silage, $10.00; soybean meal, $166.00; urea and Starea, $100.00.

[2]Maturity score: A = 1, 2, 3; B = 4, 5, 6.

[3]Marbling score: small, 13-15; modest, 16-18; moderate, 19-21.

[4]Yield grade: most desirable, 1; least desirable, 5.

a-b Horizontal values with different superscripts on the same line differ significantly (P<.05).

Wheat Head Silage and Corn Silage for Growing Steers[1]

K. K. Bolsen, K. L. Conway, and J. G. Riley

Summary

Two trials were conducted to evaluate two varieties of wheat head silage (Parker and Blue Boy) and whole-plant corn silage in growing rations for steers.

Each silage was fed to 21 steers for 122 days. All steers were full-fed a 12.5% crude protein ration containing 86% silage and 14% supplement. Steers fed corn silage gained faster, consumed more dry matter and were more efficient than steers fed either wheat head silage ration. Gain and feed consumption were greater for steers fed Blue Boy than for those fed Parker. Ration dry matter digestibility was higher for the corn silage ration than for either wheat head silage ration.

Introduction

Wheat at present prices is not competitive as a feed grain with corn or milo, but in recent years its prices were competitive with other feed grains. Practical experiences of cattle feeders, as well as research data, indicate nutritional problems associated with high levels of wheat in beef rations. An alternative to feeding wheat as grain would be to harvest all or a portion of the wheat plant as silage. Two non-nutritional advantages would be: (1) early harvesting to reduce field losses and to allow double cropping and (2) providing a late-spring silage to use silo capacity more efficiently.

The objective of this trial was to determine relative feeding values of wheat head silage and corn silage in growing rations for beef cattle.

Experimental Procedure

The two wheat varieties used were Parker (an awned, hard, red winter wheat) and Blue Boy (an awnless, soft, red winter wheat). Head silage was made from the upper one-half of the plants of each variety in the mid-to late dough stage of plant maturity. Harvest date, dry matter, and yield for the head silages are shown in table 9.1. The forage harvester was equipped with a two-inch, recutter screen. Water was added to the head material to increase moisture content six to seven percentage units. Approximately

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[1]Equipment for harvesting wheat head silage was provided by Field Queen Corporation (a division of Hesston Corporation), Maize, Kansas.

45 tons of each wheat silage were ensiled in concrete stave silos (10 ft. X 50 ft.). Irrigated corn with an estimated grain yield of 125 bu. per acre was harvested as silage and stored in 12 ft. X 60 ft. concrete stave silos.

Trial 1. Sixty-three Angus yearling steers averaging 513 lb. were used in a 122-day growing trial (October 6, 1972 to February 5, 1973). Three pens of seven steers each were randomly assigned to one of the three silages. Ration composition (dry matter basis) was 86% of the appropriate silage and 14% supplement (table 9.2). Supplement A was fed in the corn silage ration and supplement B in the two wheat head silage rations. All rations were formulated to contain 12.5% crude protein and each was mixed and fed twice daily. All steers were wormed and implanted with 36 mg. stilbestrol before the trial started. Steers were fed in 15 X 30 ft. non-sheltered, concrete pens. Twelve-hour shrunk weights were taken at the beginning and end of the trial; 28-day intermediate weights were taken before the a.m. feeding.

Trial 2. Six steers weighing 572 lb. were used in a digestion trial. Two steers received each of the silage rations described in trial 1 during a 10-day preliminary (ration adjustment period) and six-day total fecal collection period.

Results and Discussion

Chemical analyses of the silages are shown in table 9.3. Crude protein was highest in the two wheat head silages; ash and crude fiber were lowest in the corn silage. Acid content was similar for corn and Blue Boy silages; lactate tended to be lower and acetate and butyrate higher in Parker than in either of the other silages.

Results of the two trials are shown in table 9.4. Steers fed the corn silage ration gained faster ($P<.05$), consumed more ration dry matter ($P<.05$) and required less feed per lb. of gain ($P<.05$) than steers fed either of the two wheat head silage rations. Average daily gain and feed consumption were greater ($P<.05$) for steers fed Blue Boy head silage than for those fed Parker head silage. Dry matter digestibility tended to be higher for the corn silage ration than for either wheat head silage ration.

Table 9.1 Wheat Head Silage Harvest Information

Variety	Harvest date	% Dry matter at harvest	Tons of 60% moisture silage/acre	Grain yield, bu./acre
Parker head	June 8,9,10	42.7	7.8	39.0
Blue Boy head	June 11,12	42.6	6.2	38.0

Table 9.2 Composition of Supplements Fed in Silage Growth and Digestion Trials

Ingredient	Supplement A	Supplement B
	% (dry matter basis)	%
Soybean meal	87.60	---
Milo, rolled	6.72	91.44
Dicalcium phosphate	1.28	1.61
Limestone	0.58	3.12
Salt	2.14	2.14
Fat	1.00	1.00
Trace minerals	0.36	0.36
Aureomycin[a]	0.25	0.25
Vitamin A[b]	+	+
Composition (DM basis)		
Crude protein, %	43.50	9.43

[a]Formulated to supply 70 mg per steer per day.

[b]Formulated to supply 30,000 I.U. per steer per day.

Table 9.3 Analyses (100% Dry Matter Basis) of Indicated Silages

Item	Silage		
	Whole-plant corn	Blue Boy head	Parker head
Dry matter, %	33.4	35.7	36.6
Crude protein, %	8.7	13.6	13.2
Crude fiber, %	22.5	23.8	23.7
Ash, %	6.5	8.9	9.1
pH	4.22	4.31	4.30
% Lactate	2.6	2.6	1.9
% Acetate	1.5	1.6	1.8
% Butyrate	0.3	0.4	0.6

Table 9.4 Steer Performance and Ration Digestibility

Item	Silage: Whole-plant corn	Blue Boy head	Parker head
No. of steers	21	21	20[a]
Initial wt., lb.	518	514	516
Final wt., lb.	751	700	690
Avg. daily gain, lb.	1.92[b]	1.53[c]	1.41[d]
Avg. daily feed, lb.[e]			
silage	13.33	12.41	11.51
supplement	2.16	2.02	1.89
Total	15.49[b]	14.43[c]	13.40[d]
Feed/lb. gain, lb.	8.09[b]	9.49[c]	9.48[c]
DM digestibility, %[f]	70.1	66.9	66.7

[a]One steer removed as he refused to consume the ration.

[b,c,d]Means on the same line with different superscripts differ significantly (P<.05).

[e]100% dry matter basis.

[f]Each value is the mean for two steers.

Corn Silage, Wheat Head Silage and Milage for Finishing Cattle[1,2,3]

K. K. Bolsen, J. G. Riley, K. L. Conway
and Pamela Henry

Summary

Six finishing rations were compared: (1) 10% corn silage, (2) 20% corn silage, (3) 10% wheat head silage, (4) 20% wheat head silage, (5) unprocessed (whole) milage and (6) processed (rolled) milage. Each ration was fed to 18 yearling steers for 123 days. Rate of gain was not affected by ration. Feed consumption and feed required per lb. of gain were higher for steers receiving whole milage than for steers receiving any of the other five rations. Although steers fed rolled milage consumed less feed, they were 11.4 percent more efficient than steers fed whole milage.

Introduction

Beef cattle on most finishing rations require some roughage for maximum performance. Roughage decreases the incidence of founder, liver abscesses and digestive upsets. Corn silage is an effective roughage for feedlot rations; but, little is known about wheat head silage or milage.

Milo harvested as head-chop silage could supply all or a part of both the grain and roughage in feedlot rations. Head-chopping milo (25 to 32% grain moisture) would also permit earlier, more efficient harvesting.

The purposes of this trial were to evaluate source and level of roughage and to compare unprocessed (whole) with processed (rolled) milage in beef finishing rations.

Experimental Procedures

Ninety Angus, Hereford and crossbred yearling steers averaging 724 pounds were allotted by breed and weight to 18 pens of five steers each. Three pens were randomly assigned to each of the following rations: (1) 10% corn silage, (2) 20% corn silage, (3) 10% wheat head silage, (4) 20% wheat head silage, (5) unprocessed (whole) milage and (6) processed (rolled) milage. Eight Angus steers weighing 784 pounds were allotted to individual pens; four steers were randomly assigned to rations 5 and 6. Compositions of the final rations and supplements are shown in table 10.1.

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[1] In this report, the term "milage" refers to milo head-chop silage.

[2] Equipment for harvesting milage was provided by Field Queen Corporation (a division of Hesston Corporation), Maize, Kansas.

[3] Roller mill for processing milage was provided by Dodson Manufacturing Co., Wichita, Kansas.

The corn silage and wheat head silage (Parker) are the same as those described on page 33 of this publication. The milage was harvested from one source in mid-September, 1972. The forage harvester was equipped with a two-inch recutter screen. Grain moisture was 28 to 32 percent and milage moisture was 36 to 42 percent. Water was added to the milage to increase its moisture content approximately eight percentage units. Milage was ensiled in 10 ft. X 50 ft. concrete stave silos; dry matter, protein and fiber content are shown in table 10.1. Milage dry matter contained 71 percent grain and 29 percent forage.

Each steer was implanted with 36 mg. of stilbestrol at the beginning of the 123-day finishing trial (February 15 to June 18, 1973). All rations were mixed and fed twice daily.

Steers fed corn silage or wheat head silage (rations 1-4) received 35 percent silage rations at the start of the trial. Silage was reduced to 20 percent after five days, and to 10 percent in another five days in rations 1 and 3. Steers fed milage (rations 5 and 6) received the same ration throughout the trial. Milage for ration 6 was processed through a roller mill to crack all of the milo; an estimated 20 to 30 percent of the grain was cracked in the unprocessed milage in ration 5.

Initial and final weights of the steers were taken after 15 hours without feed or water. Final live weights were adjusted to a 62.5 percent dress and feedlot performance was calculated on that basis.

Three individually-fed steers receiving rations 5 and 6 were placed in metabolism stalls for ten days mid-way through the trial. After a four-day adjustment period, total feces were collected for six days.

Results

Feedlot performance for the group-fed steers is presented in table 10.2. Performance by pens of cattle fed the same rations varied quite widely. Steers fed 10 and 20 percent corn silage or wheat head silage rations had similar rates and efficiencies of gains. Steers fed milage (rations 5 and 6) tended to gain less than steers fed any of the other four rations, although the difference was not significant. Cattle receiving whole milage (ration 5) consumed more dry matter ($P<.05$) and required more feed per lb. of gain ($P<.05$) than cattle receiving rolled milage (ration 6), corn silage (rations 1 and 2) or wheat head silage (rations 3 and 4). Assuming that corn silage and wheat head silage dry matter contained about 45 and 35 percent grain, respectively, steers fed rolled milage required less grain dry matter per lb. of gain ($P<.05$) than steers fed any of the other five rations. Dressing percentage, quality grade and yield grade were not influenced by rations fed.

Response of the individually-fed steers was similar to that of group-fed steers for rations 5 and 6 (table 10.3). Cattle fed whole milage consumed more feed ($P<.05$) than cattle fed rolled milage. Also, apparent ration dry matter digestibility tended to be lower for whole milage than for rolled milage.

Table 10.1. Ration and Supplement Compositions and Milage Analyses (%, Dry Matter Basis)

Item	Silage					
	Corn		Wheat head		Milage	
	10%	20%	10%	20%	Whole	Rolled
Ration ingredients						
Corn, cracked	41.25	36.25	41.25	36.25	---	---
Milo, steam flaked	41.25	36.25	41.25	36.25	---	---
Corn silage	10.0	20.0	---	---	---	---
Wheat silage	---	---	10.0	20.0	---	---
Milage	---	---	---	---	92.5	92.5
Supplement	7.5	7.5	7.5	7.5	7.5	7.5
Supplement ingredients						
Soybean meal	27.6	35.4	10.4	0.6	7.8	
Milo, rolled	47.2	42.3	62.6	74.4	71.0	
KCl	2.7	0.8	3.8	1.9	---	
Dicalcium PO_4	0.5	0.7	0.5	1.4	---	
Limestone	9.7	8.5	10.4	9.4	7.0	
Salt	3.4	3.4	3.4	3.4	3.4	
Fat	1.0	1.0	1.0	1.0	1.0	
Trace minerals	0.8	0.8	0.8	0.8	0.8	
Aureomycin[a]	0.5	0.5	0.5	0.5	0.5	
Vitamin A[b]	0.1	0.1	0.1	0.1	0.1	
Urea	6.5	6.5	6.5	6.5	8.4	
Milage analyses						
Dry matter					49.80	
Crude protein					9.00	
Crude fiber					12.7	

[a]Formulated to supply 70 mg per steer per day.

[b]Formulated to supply 30,000 I.U. per steer per day.

Table 10.2. Feedlot Performance of Group-Fed Steers

	Silage					
	Corn		Wheat head		Milage	
Item	10%	20%	10%	20%	Whole	Rolled
No. of steers	15	15	15	15	15	15
Initial wt., lbs.	725	721	728	722	723	725
Final wt., lbs.	1032	1051	1040	1025	1020	1010
Avg. daily gain, lbs.	2.49	2.68	2.54	2.47	2.41	2.32
Avg. daily feed, lb.[c]						
milo, fl.	6.80	6.50	7.11	6.45	---	---
corn, cr.	7.01	6.70	7.33	6.65	---	---
milage	---	---	---	---	19.75	16.87
corn sil.	2.22	3.96	---	---	---	---
wheat sil.	---	---	2.40	4.03	---	---
supplement	1.35	1.46	1.37	1.43	1.61	1.38
Total	17.38[a]	18.62[a]	18.21[a]	18.56[a]	21.36[b]	18.25[a]
Feed/lb. gain, lb.	7.02[a]	6.96[a]	7.32[a]	7.53[a]	8.89[b]	7.87[a]
Dressing %	62.9	62.4	62.3	62.3	62.1	63.1
Quality grade[d]	10.5	10.5	10.4	10.5	10.5	9.9
Yield grade	3.12	3.17	3.03	2.87	2.88	2.60
Condemned livers	0	2	1	1	0	2

[a,b]Means in the same row with different superscripts differ significantly ($P<.05$).

[c]100% dry matter basis.

[d]Quality grade assigned, 10 = low choice, 11 = average choice.

Table 10.3. Feedlot Performance and Ration Digestibility of Individually-fed Steers fed Whole or Rolled Milage

	Milage	
	Whole	Rolled
No. of steers	4	4
Initial wt., lb.	750	707
Final wt., lb.	1003	957
Avg. daily gain, lb.	2.06	2.03
Avg. daily feed, lb.[a,b]		
milage	16.98 (34.7)	14.69 (30.0)
supplement	1.39	1.23
Total	17.37	15.92
Feed/lb. gain, lb.	9.08	7.85
Dressing %	61.6	62.4
Quality grade[c]	10.5	10.25
Yield grade	3.01	3.04
Condemned livers	0	0
Ration dry matter digestibility, %[d]	70.8	73.5

[a]100% dry matter basis.

[b]Values in parentheses are milage intake on an as-fed moisture basis.

[c]Quality grade assigned, 10 = low choice, 11 = average choice.

[d]Each value is the mean for three steers.

Influence of Alfalfa Harvesting and Storing Methods on Steer Performance

K. K. Bolsen, J. G. Riley and Larry L. Berger

Summary

Three alfalfa treatments were evaluated in a steer performance trial: (1) direct-cut and ensiled with dry milo, (2) field-wilted and ensiled, with milo added at feeding and (3) baled, with milo added at feeding. The rations contained 45.4, 50.9 and 48.1 percent milo, respectively. During the 84-day trial, yearling steers made similar gains on the three rations. Direct-cut and ensiled alfalfa produced the most efficient gain; hay the least efficient. Potential beef gain per acre of alfalfa was lowest from baled hay.

Introduction

Alfalfa's importance for beef production is increasing in Kansas. It can be an economical and efficient source of energy, protein, minerals (especially calcium) and vitamin A in both maintenance and growing rations. Alfalfa commonly is fed as baled hay. Haying has high labor requirements and often results in excessive nutrient losses from either field drying or weathering. Ensiling alfalfa as silage (50 to 65 percent moisture) or as haylage (30 to 50 percent moisture) usually decreases nutrient losses during harvest but increases nutrient losses during storage. Alfalfa cut and ensiled with more than 75 percent moisture usually produces a poor quality silage. Lowering the moisture content by either field-wilting or adding a dry grain or roughage has improved silage quality and reduced nutrient losses during storage.

Results from other experiment stations comparing nutritive values of alfalfa hay and alfalfa silage (or haylage) have not been consistent.

The objective of this trial was to compare feeding values of three alfalfa harvesting and storing methods in growing rations for yearling steers: (1) direct-cut and ensiled with dry milo, (2) field-wilted and ensiled and (3) baled.

Experimental Procedure

First-cutting alfalfa used in this trial was harvested from a single field at about one-fourth bloom (May 24, 25, and 26, 1973). Direct-cut alfalfa (approximately 77 percent moisture) was harvested with a field-chopper[1] following a mower-swather. Each load was weighed and sampled

[1] Forage harvester was provided by Field Queen Corporation (a division of Hesston Corporation), Maize, Kansas.

and dry rolled milo was added to lower the moisture content of the alfalfa-milo mixture to 60 to 65 percent. The mixture was 53.4 percent alfalfa and 46.7 percent milo on a dry matter basis. Field-wilted alfalfa (approximately 60 percent moisture) was harvested after drying 24 hours. Both direct-cut and field-wilted materials were stored in 10 ft. X 50 ft. concrete stave silos. The forage chopper was equipped with a three-inch recutter screen. Hay was baled (60 to 70 lb. bales) after field drying 48 hours.

Fifty-four yearling mixed breed steers averaging 476 lb. were randomly allotted to nine pens of six steers each. Three pens of steers were assigned to one of the three alfalfa treatments. Dry rolled milo was added to the field-wilted silage and hay rations at feeding time in an attempt to equalize the grain content in the three rations. Final ration compositions are shown in table 11.1. Ration 1 (direct-cut silage) contained the lowest percent milo (45.4%); ration 2 (field-wilted silage) the highest percent milo (50.9%). All rations were mixed and fed twice daily; hay was chopped before being fed. A supplement (footnote, table 11.1) fed at 0.5 lb. per steer per day supplied salt, trace minerals, phosphorus and an antibiotic. Initial and final weights of the steers were taken after 15 hours without feed or water. The trial began June 27, 1973 and ended September 19, 1973 (84 days).

Results and Discussion

Seepage losses occurred in the silage that was direct-cut and ensiled with dry milo; but except for the usual top spoilage, no additional mold or deterioration was observed in either of the two alfalfa silage treatments.

Steer performance is presented in table 11.2. Rates and efficiencies of gains were excellent for all cattle. This seemed to be due to the thin condition of the steers at the start of the trial and an unusually high dry matter consumption (2.89 to 3.43 percent of body weight). Average daily gain was nearly identical for all steers regardless of alfalfa treatment. Those fed alfalfa hay consumed more dry matter but were less efficient than those fed either of the alfalfa silage rations. Steers fed direct-cut silage consumed less feed yet were more efficient than steers fed field-wilted silage.

Feed consumption decreased as moisture content of the alfalfa (and total ration) increased; which agrees with results from other stations.

Although the direct-cut alfalfa ration had the highest alfalfa to milo ratio, it produced the most efficient gains, which was opposite from expected results but several explanations are possible. First, fermentation in the silo may have increased digestibility of the alfalfa, milo or both; second, nutrients absorbed may have been used more efficiently; third, direct-cutting may have preserved more of the nutrients available in the alfalfa.

Average harvest and storage losses reported at other stations are combined (table 11.3) with our steer performance data (table 11.2). The somewhat arbitrary loss figures are influenced by such factors as: stage of maturity, moisture content, fineness of chop, type and size of silo and weather at harvest. Based on potential gain per acre of alfalfa, direct-cut and field-wilted silages produced 16 and 20 percent more gain, respectively, than baled hay. Direct-cut silage also required 18 percent less milo per lb. of gain than either field-wilted silage or baled hay.

Table 11.1. Compositions and Analyses (%, Dry Matter Basis) of Alfalfa Rations

	Ration		
	1	2	3
	Alfalfa treatment		
Ingredient	Direct-cut silage	Field-wilted silage	Baled hay
Alfalfa	52.0	46.7	49.7
Milo, rolled	45.4[a]	50.9[b]	48.1[b]
Supplement[c]	2.6	2.4	2.2
Dry matter, %	36.9	62.8	87.0
Crude protein, %	14.4	13.7	14.4
Alfalfa:milo ratio	1.15:1	0.92:1	1.04:1

[a] Added at ensiling.

[b] Added at feeding.

[c] lbs./ton: rolled milo, 1408.0; dicalcium phosphate, 347.0; salt, 167.0; fat, 20.0; aureomycin, 28.0; trace mineral premix, 30.0.

Table 11.2. Steer Performance, June 27, 1973 to September 19, 1973 (84 days)

Item	Ration 1: Alfalfa treatment: Direct-cut silage	Ration 2: Alfalfa treatment: Field-wilted silage	Ration 3: Alfalfa treatment: Baled hay
No. of steers	18	18	18
Initial wt., lb.	482	478	477
Final wt., lb.	731	726	726
Avg. daily gain, lb.	2.96	2.96	2.97
Avg. daily feed, lb.[a]			
alfalfa	9.04	8.89	10.27
milo	7.89	9.69	9.92
supplement	0.45	0.45	0.45
Total[b]	17.38[c] (2.89)	19.03[d] (3.16)	20.64[e] (3.43)
Feed/lb. gain, lb.	5.87[c]	6.43[d]	6.95[e]

[a]100% dry matter basis.

[b]Values in parentheses are dry matter intake as a percent of body weight.

[c,d,e]Means on the same line with different superscripts differ significantly ($P<.05$).

Table 11.3. Potential Gain per Acre from each of the Three Alfalfa Treatments

	Ration		
	1	2	3
	Alfalfa treatment		
Item	Direct-cut silage	Field-wilted silage	Baled hay
DM[a]/lb. of gain[b]			
alfalfa, lb.	3.05	3.00	3.46
milo, lb.	2.67	3.28	3.34
Potential DM yield/acre, lb.[c]	5,500	5,500	5,500
DM loss at harvest, lb.[d]	550 (10%)	825 (15%)	1,320 (24%)
DM loss during storage, lb.[d]	825 (15%)	413 (7.5%)	275 (5%)
DM actually fed, lb.	4,125	4,262	3,905
Gain/acre of alfalfa, lb.	1,352	1,420	1,129

[a]DM = dry matter.

[b]From data reported in table 11.2.

[c]Average yield in Kansas; Kansas State Board of Agriculture, 55th Annual Report, 1971-72.

[d]Percent DM loss in parenthesis.

Yield and Composition of Grain Sorghum Stover

R. L. Vanderlip[1], Larry R. Schneider[1], and K. K. Bolsen

Introduction

Last year in Kansas approximately 3.8 million acres produced 243 million bushels of grain sorghum plus a large amount of forage left in the field as a potential source of feed for livestock.

The objective of this report is to indicate the quantity of forage available after normal and early (high-moisture) harvest of sorghum grain.

Experimental Procedure

Effects of sorghum heights, harvest dates, and hybrids on grain and forage yield and quality were studied in 1971 and 1972 at the Agronomy Farm, Manhattan, and the South-central Kansas Experiment Field, Hutchinson. How heights effect grain and forage yield has been reported previously.

Grain and forage were hand harvested from sorghum hybrids RS 650 and RS 702 at approximately 35 and 15 percent grain moisture. Each treatment was replicated six times at each location. Grain was threshed from the heads, and total grain and stover weights were taken and converted to per acre yields.

Crude protein (CP) (Kjeldahl nitrogen x 6.25) and *in vitro* dry matter digestibility (IVDMD) were determined for stover subsamples.

Results and Discussion

Table 12.1 shows the grain and stover yields and stover quality measurements. As plots were hand harvested, yields were total material present and would be greater than could be recovered by machine harvest.

Between the early and late dates of harvest, there were no significant decreases in stover tonage; but in some cases, late harvest gave higher stover yields. These increases (in 1972) were from late growth of branches. Similarly, protein content of the stover differed little between the two harvest dates. Percent IVDMD did not change consistently during harvest. 1971 Manhattan samples seemed to be low in digestibility. Data show that following grain harvest 1.5 to 2.5 tons of stover per acre is available from either early, high moisture or normally harvested grain sorghum.

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[1]Department of Agronomy.

[2]Windscheffel, J. A., R. L. Vanderlip, and A. J. Casady. 1973. Performance of 2-dwarf and 3-dwarf grain sorghum hybrids harvested at various moisture contents. Crop Science 13:215-219.

Table 12.1. Yields of Indicated Grain Sorghums (Grain and Stover) and Stover Quality at Indicated Kansas Locations

			Stover from high moisture grain harvest				Stover from normal grain harvest			
Location and year	Hybrid	Grain yield, lb./acre	Yield, ton/acre	CP, %	IVDMD, %	Grain moisture, %	Yield, ton/acre	CP, %	IVDMD, %	Grain moisture, &
Hutchinson, 1971	RS650	3654	1.63	6.1	43.2	31.9	1.55	6.1	41.9	11.0
	RS702	3543	1.74	5.9	42.6	32.5	1.62	5.5	39.4	11.3
Manhattan, 1971	RS650	6712	2.04	7.6	26.6	32.4	2.00	5.7	29.5	15.6
	RS702	6956	2.66	4.5	27.7	31.5	2.61	3.9	27.1	15.2
Hutchinson, 1972	RS650	3086	1.53	7.8	40.1	30.0	1.49	9.0	29.8	14.2
	RS702	3465	2.06	7.6	36.4	34.8	1.85	8.4	37.3	16.0
Manhattan, 1972	RS650	5437	1.72	10.6	28.2	38.7	2.67	8.7	46.4	15.4
	RS702	6043	2.40	8.9	38.7	38.1	2.84	7.8	39.1	16.1

Milo Stover for Growing Heifers

K. K. Bolsen, Gary Boyett and J. G. Riley

Summary

Five rations (involving 4 forage treatments) were compared: (1) forage sorghum silage, (2) forage sorghum silage ensiled with organic acids, (3) milo stover pellets, (4) milo stover silage and (5) milo stover silage plus rolled milo. Each ration was fed to 13 heifer calves for 114 days. No differences were observed in gain, intake or feed efficiency between heifers fed untreated and organic acid-treated forage sorghum silage. Pelleting milo stover increased dry matter consumption over milo stover silage but resulted in a poorer feed conversion. Adding rolled milo to stover silage improved gain and feed conversion compared to stover silage or pellets.

Results indicate that growing heifers can make substantial winter gains on properly supplemented milo stover rations. The feeding value of forage sorghum silage was not improved by adding organic acids.

Introduction

Millions of tons of grain sorghum stover are available to Kansas farmers and ranchers each fall, but it is not yet being widely used in cattle feeding programs. Much that is used is grazed by beef cows. Milo stover can be successfully ensiled. Several weeks after killing frosts, it contains adequate moisture for ensiling. Data at this station indicate that milo stover silage is an excellent source of energy for beef cows or ewes during gestation.

Is milo stover limited to use only in maintenance rations? Little is known about the potential of milo stover in production rations for beef cattle, so one objective of this trial was to determine relative feeding values of milo stover and forage sorghum in rations for growing heifers. Pelleting improves the nutritive value of such low quality forages as prairie hay, so a second objective was to compare ensiled and pelleted milo stover.

Experimental Procedure

Milo stover and forage sorghum were each harvested from a single source with a forage harvester[1] equipped with a three-inch, recutter screen. Milo stover was harvested October 25, 26, and 27,1972 (after a killing frost) from grain sorghum that yielded 93 bu. per acre. Grain

[1] Forage harvester was provided by Field Queen Corporation (a division of Heston Corporation), Maize, Kansas

and stover moisture at harvest were approximately 18 and 70 percent, respectively. Milo stover pellets (¼ inch) were processed by a commercial dehydrator[2] and stored in a metal hopper bin. An organic acid mixture[3] was applied to one silo of forage sorghum at 7.5 lbs. per ton of wet forage. Approximately 50 tons of each silage were ensiled in upright, concrete stave silos (10 ft. X 50 ft.).

Sixty-five Angus, Hereford and crossbred replacement heifer calves averaging 455 lb. were randomly allotted by weight and breed to each of five rations for a 114-day growing trial beginning December 20, 1972. There were 13 heifers per treatment, in two pens of six and seven head. Rations compared were: (1) forage sorghum silage (2) forage sorghum silage ensiled with organic acids, (3) milo stover pellets, (4) milo stover silage and (5) milo stover silage plus rolled milo.

Rations 1, 2, 3, and 4 contained 76.0% of the appropriate forage, 12.0% dehydrated alfalfa pellets and 12.0% supplement (dry matter basis). Ration 5 was 57.8% stover silage, 18.2% rolled milo, 12.0% dehydrated alfalfa pellets and 12.0% supplement (dry matter basis). Rolled milo was added to ration 5 to assure an average daily gain of at least 1.5 lb. All rations were formulated to be equal in crude protein (12.5%), minerals and additives. Compositions of the supplements are shown in table 13.1. Supplement A was fed with rations l-4; supplement B with ration 5. Rations were mixed and fed twice daily. Initial and final weights of heifers were taken after 15 hours without feed or water; 28-day intermediate weights were taken before the a.m. feeding.

Results

Chemical analyses of the forages are shown in table 13.2.

Heifer performance is shown in table 13.3. Heifers fed untreated and organic acid-treated forage sorqhum silage and milo stover silage plus rolled milo (rations 1, 2 and 5) had similar rates of gain, intakes and efficiencies. Performance of heifers receiving milo stover pellets or silage without additional grain (ration 3 or 4) was less than that of heifers receiving any of the other three rations. Pelleting milo stover improved consumption over milo stover silage but resulted in poorer feed conversion.

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[2] C K Processing Co., Inc., Manhattan, Kansas.

[3] Organic acid mixture (trade name - ChemStor) contained 60% acetic and 40% propionic acids and was provided by Celanese Chemical Co., Corpus Christi, Texas.

Table 13.1. Composition of the Supplements[a]

Ingredient	Supplement A	Supplement B
	% (dry matter basis) %	
Soybean meal	77.27	62.00
Milo, rolled	5.55	21.57
Dehydrated alfalfa	10.00	10.00
Dried Masonex	1.00	1.00
Dicalcium phosphate	3.00	2.25
Salt	2.00	2.00
Trace mineral premix	0.50	0.50
Vitamin A premix[b]	0.33	0.33
Aureomycin[c]	0.35	0.35

[a] Fed as a 3/16-inch pellet.

[b] Formulated to supply 30,000 I.U. per heifer per day.

[c] Formulated to supply 70 mg. per heifer per day.

Table 13.2. Proximate Analyses (100% Dry Matter Basis) and pH of the Four Forage Treatments

	Forage sorghum silage		Milo stover	
Item	Untreated	Organic acid-treated	Silage	Pellet
Dry matter, %	29.4	31.6	28.8	89.2
Ash, %	8.5	8.7	11.5	12.1
Crude protein, %	8.0	7.7	7.7	7.7
Crude fiber, %	21.6	23.5	30.8	31.5
Ether extract, %	1.8	2.1	1.7	2.0
NFE, %	60.1	58.0	48.3	46.7
pH	4.10	3.90	4.05	- - -

Table 13.3. Performance of Growing Heifers, December 20, 1972, to April 14, 1973 (114 days).

	Treatment				
	Forage sorghum silage		Milo stover		
Item	Untreated	Organic acid-treated	Pellet	Silage	Silage + rolled milo
Ration number	1	2	3	4	5
No. of heifers	13	13	13	13	13
Initial wt., lb.	448	448	444	464	456
Final wt., lb.	642	652	600	600	635
Avg. total gain, lb.	194	187	156	136	179
Avg. daily gain, lb.	1.70[a]	1.64[a,b]	1.37[b,c]	1.20[c]	1.57[a,b]
Avg. daily feed, lb.[d]					
silage &/or pellets	9.91	10.44	12.15	8.48	7.39
milo, rolled	---	---	---	---	2.41
dehy alfalfa pellets	1.74	1.74	1.93	1.50	1.70
supplement	1.70	1.70	1.88	1.48	1.65
total[e]	13.35[a,b]		15.96[a]	11.46[b]	13.15[a,b]
	(2.44)	(2.48)	(3.06)	(2.16)	(2.41)
Feed/lb. gain, lb.	7.87[a]	8.51[a,b]	11.68[c]	9.58[b]	8.36[a,b]

[a,b,c] Means on the same line with different superscripts differ significantly (P<.05).

[d] lOO% dry matter basis.

[e] Values in parentheses are dry matter intake as a percent of body weight.

Weaning Calves Early

Miles McKee, K. K. Bolsen, J. G. Riley
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Summary

An 85-day, post-weaning growth rate for 30 calves weaned at an average age of 110.5 days was compared with the growth rate of 30 calves nursing their mothers the same period. Average age of the nursing calves at the start of the test was 106.2 days.

All calves received creep feed free-choice. The early weaned calves were divided into two groups; one group (A) received direct-cut alfalfa wilted with rolled milo free-choice; the other (B), field-wilted haylage plus rolled milo free-choice. Twenty-four of the later weaned calves were confined to dry lot with their mothers, and 6 (D) nursed their mothers on pasture.

Average daily gains (lbs.) and feed costs per pound of gain for the calves in groups A through D, respectively, were: 2.97, $0.232; 2.50, $0.254; 3.03, $0.309 and 2.87, $0.229. Feed cost per pound of gain was computed by combining 85 day feed cost of cow and calf and dividing by the calves gain.

Introduction

Confinement systems for managing beef cows and weaning calves early might lead to cheaper calf production because their mothers would need less feed. That idea was tested during the summer of 1973.

Experimental Procedure

Sixty Simmental percentage calves, 33 bulls, and 27 heifers were used: 13 cow-calf pairs were on native grass; 47 cow-calf pairs in dry lot. All calves had access to creep feed (table 14.1) for three weeks before the trial started July 6, 1973. Seven calves from pasture and 23 from dry lot were randomly assigned by sex and age to two groups for early-weaning (groups A, B). Twenty-four cow-calf pairs remained in dry lot (group C) and 6 cow-calf pairs remained on grass (group D). Average age in days and range in days for each of the four groups were: A, 113.1, 73-136; B, 108.1, 64-131; C, 105.4, 50-133; and D, 109.3, 76-136. The trial was completed September 29 when calves in groups C and D were weaned.

All calves had continued access to creep feed throughout the 85-day trial. Group A was fed direct-cut alfalfa wilted with rolled milo;

group B, field-wilted haylage plus rolled milo. The alfalfa treatments are described on page 40. Group C had access to the feed bunk when their mothers were fed a silage-grain ration, and group D could graze native grass.

The cows in dry lot were divided into two groups, those nursing calves and dry cows, and fed as indicated in table 14.2. Cows on native grass received no supplemental feed during the trial.

Results and Discussion

Performances of the calves are shown in table 14.3. Several group B calves bloated during the first few weeks of the trial. They were fed prairie hay free-choice the last 28 days of the test. Their average daily gain was less than that of calves in any other group. Calves nursing their mothers in dry lot had the highest average daily gains and cost per pound of gain.

Table 14.1. Creep Ration for All Calves

Ingredient	Lbs.
Rolled oats	1455
Flaked milo	353
Soybean oil meal	91
Alfalfa crumbles	91
Pre-mix[a]	10
Salt	10

[a]Pre-mix, lbs. per 50 lbs: rolled milo, 38.7; trace mineral, 5.0; aurofac-10 3.0; Vitamin A, 3.3.

Table 14.2. Eighty-five Day Feed for Cows (7/6 - 9/29)[a, b, c]

Ingredient	Confined cows, nursing[d] daily intake (lbs)	Confined cows, nursing[d] total intake (lbs)	Confined cows, nursing[d] total cost	Confined cows dry[d] daily intake (lbs)	Confined cows dry[d] total intake (lbs)	Confined cows dry[d] total cost	Pasture cows nursing days	Pasture cows nursing total cost
Sorghum silage	40	3400	$23.80	24	2040	$14.28	--	--
Flaked milo	7	596	22.95	4	340	13.09	--	--
Cottonseed oil meal	1.5	127.5	14.98	--	--	--	--	--
Native pasture	--	--	--	--	--	--	85	$28.33
Eighty-five day cost			$61.73			$27.37		$28.33

[a] - Salt & minerals ad libitum

[b] - as fed basis

[c] - Feed costs:
sorghum silage - $14.00/T
flaked milo - $3.85/cwt
cottonseed oil meal - $235/T
native pasture - $60/season

[d] - 50,000 IU vitamin A daily

Table 14.3 Performance of Calves

Indicated factor	Treatment Group[a]			
	A	B	C	D
No. of calves	15	15	24	6
Avt. wt. 7/6, lb	242	233	239	262
Avg. wt. 9/29, lb	494	446	496	506
Avg. daily gain, lb	2.97	2.50	3.03	2.87
Daily feed/calf, lb[b]				
creep ration	8.60	7.82	6.25	9.70
alfalfa	1.51	.77	--	--
milo	1.34	.78	--	--
prairie hay	--	.75	--	--
Total 85 day feed/calf[b]				
creep ration	730.67	665.00	531.24	824.17
alfalfa	128.66	65.55	--	
milo	114.10	66.24	--	
prairie hay	--	63.75	--	
85 day feed cost/calf[c]	$31.04	$26.71	$17.74	$27.53

[a] A = early wean, direct cut alfalfa + rolled milo
B = early wean, field wilted haylage + rolled milo
C = nursing mothers in confinement
D + nursing mothers on pasture

[b] Air dry basis

[c] Feed costs:
creep ration - $66.70/T
alfalfa - $35.00/T
milo - $3.85/cwt
prairie hay - $25.00/T

Protein Levels for Bulls on 140-Day, Gain Test

Miles McKee, R. R. Schalles and K. O. Zoellner

Summary

Three trials with Angus, Hereford, and Shorthorn bulls produced in the University teaching herd were conducted to determine effects of 10, 12, or 14% calculated crude protein levels in grain rations.

In trial 1, the 10% crude protein grain rations resulted in significantly ($P<.01$) lower gains than did either 12 or 14% crude protein grain rations. The 10% ration was not tested in trials 2 and 3.

Rates of gain and feed per pound of gain did not differ significantly between bulls fed 12% or 14% protein rations.

Introduction

With increased need for rate of gain information on bulls, many questions concerning protein levels have been raised. Three levels of protein were tested in these trials.

Experimental Procedure

We used bulls produced in the University teaching herd in the spring of 1970 and 1971 and the fall of 1970. The two spring born crops were started on test in November the year they were born; fall born calves were started the following May. All trials were for 140 days.

In 1970, trial 1, 12 Angus, 9 Hereford, and 3 Shorthorn bulls averaging 233 days old and 497 pounds were randomly assigned by breed to a 10%, 12%, or 14% calculated crude protein (table 15.1). Chemical analyses were 11.32%, 13.2%, and 14.6% protein. Bulls were individually stalled in a barn with a self-feeder and automatic waterer in each stall. Prairie hay was fed for 30-minute consumption twice daily. All bulls were placed in an exercise lot approximately 6 hours each day. Bulls averaged 851 pounds off test.

Trials 2 and 3, fall 1970 and spring 1971 calves, were conducted using 12 and 14% rations. Three Angus, 2 Herefords, and 6 Shorthorns (trial 2) were placed on test at 214 days average and 395 pounds average weight. Bulls were randomly assigned by breed and feed as in trial 1. Average off test weight in September was 785 pounds. The 1971 trial involved 4 Angus, 10 Hereford, and 2 Shorthorn bulls placed on feed at an average age of 220 days and 471 pounds. Bulls were randomly assigned to the two test rations by breed and group-fed with grain available in self-feeders. Prairie hay was fed ad libitum. Average weight off test was 872 pounds.

Because the bulls were part of the teaching herd, it was necessary to use them for classwork and extra-curricular activties during the test.

Results and Discussion

Bulls fed the 10% protein ration in trial 1 gained significantly (P<.01) less, ADG 2.09, than bulls fed 12% (ADG 2.59) or bulls fed 14% protein rations (ADG 2.68). Semen collected by electroejaculation at the end of trial 1 was evaluated for volume and quality. There was no difference among bulls on different rations.

Although bulls fed the 14% ration gained slightly more than bulls fed the 12% ration (2.85 to 2.75 ADG), trials 1, 2, and 3, the difference was not statistically significant. Bulls were weighed at approximately 28 day intervals during the trials (table 15.2). Rations tested did not affect rate of gain.

Trials to study the effect of energy composition of rations are currently in progress.

Table 15.1. Rations for Gain Testing Bulls

Ingredient, lbs.	10% Protein (Ration A)	12% Protein (Ration B)	14% Protein (Ration C)
Rolled oats	1600	1455	1334
Flaked milo	390	353	324
Soybean oil meal	---	91	166
Alfalfa crumbles	---	91	166
Pre-mix[a]	10	10	10
Salt	10	10	10

[a]Pre-mix in lbs. = Rolled milo, 38.5; trace mineral, 5.0; Aurofac 10, 3.0; Vitamin A, 3.3.

Table 15.2. Average Daily Gain (pounds) by Bulls from Start of Trial to Indicated Weigh Periods

	Trial 1, 24 bulls				
Cumulative days on test	31	56	84	112	140
Daily gain on:					
10% ration, A	0.88	1.83	2.22	1.77	2.03
12% ration, B	1.45	2.40	2.76	2.34	2.54
14% ration, C	1.54	2.70	2.95	2.42	2.61
	Trial 2, 11 bulls				
Cumulative days on test	28	56	84	112	140
Daily gaon on:					
12% ration, B	3.43	2.98	3.09	3.12	2.89
14% ration, C	3.48	2.65	3.06	3.04	2.95
	Trial 3, 16 bulls				
Cumulative days on test	29	55	84	112	140
Daily gain on:					
12% ration, B	3.90	3.64	3.35	2.89	2.81
14% ration, C	3.81	3.57	3.37	3.09	2.99

Synchronizing Estrus in Heifers with Prostaglandin and Syncro-mate B

G. Heersche, Jr., Guy Kiracofe, Miles McKee
D. L. Davis and G. R. Brower

Summary

Forty-seven of 50 heifers were in estrus 1 to 5 days after an injection of prostaglandin given when an ear implant of Synchro-mate B was removed. The implant had been in place one week. Thirty of the 47 (63.8%) heifers with synchronized estrus conceived on first artificial insemination. Twenty untreated heifers were in estrus in 27 days; 13 (65%) conceived on first artificial insemination.

Introduction

Methods currently available to synchronize estrus in cattle have not been widely accepted. Increased management and labor, problems with feeding and concentrating cattle, and decreased fertility have deterred estrous synchronization. Recently, new compounds that avoid some of the previous problems, have become available for experimentation. Prostaglandin, a fatty acid related compound first isolated from semen, can now be synthesized from sea coral. One series of this compound ($F_{2\alpha}$), when injected, regresses the corpus luteum of a cow if she is at least 5 days post estrus. That terminates her cycle so she returns to estrus. Another compound, Syncro-Mate B is a synthetic progesterone that can be implanted in the ear and removed when desired. While implanted it prevents cows from showing estrus.

We tested the effectiveness of Syncro-Mate B and prostaglandin ($F_{2\alpha}$) in synchronizing estrus. Syncro-Mate B was given to prevent estrus for 7 days.

Experimental Procedure

Syncro-Mate B (6 mgs., G. D. Searle Co.) was implanted in one ear of 50 heifers and removed 7 days later. Prostaglandin (30 mgs., $F_{2\alpha}$, The UpJohn Co.) was injected intramuscularly when the implant was removed. The heifers, confined to dry lot with 20 untreated heifers, were observed for estrus. Each one observed in estrus was moved to another pen. All heifers were bred by artificial insemination 12 to 18 hours after being observed in standing estrus. First service conception was determined by rectal pregnancy diagnosis 65 and 95 days later.

Results and Discussion

Estrus and conception results are shown in table 16.1. Forty-one of the 50 treated heifers exhibited estrus in a 36 hour period between pm day 1 and am day 3 (prostaglandin injected am day 0). Forty-seven of the treated heifers exhibited estrus in an 84 hour period between pm day 1 and am day 5. Thirty of the 47 synchronized heifers conceived from the first insemination (63.8%).

Three heifers were not found in estrus during this period. One was in estrus am day 7, one am day 19, and one failed to show estrus.

The 20 control heifers were all observed in estrus in a 27 day period. Thirteen (65%) conceived to the first insemination. Conception rates at subsequent estrus periods were not different between treated and untreated heifers.

This method of synchronizing estrus appears to be superior to earlier methods. Cattle must be handled twice, to put in the implant and 7 days later to remove it and inject prostaglandin. Cattle must be closely observed the next 5 days. It is essential in large groups to remove animals in estrus to determine onset of estrus in others. We noticed no detrimental side effects during our tests. Estrus periods were normal length, and later cycles were normal in heifers that did not conceive at first service.

Syncro-Mate B and prostaglandin are not yet approved. Until they are approved for sale, their cost is unknown.

Table 16.1. Occurrence of Estrus and Conception Rate in Heifers Treated with Syncro-Mate B and Prostaglandin

	Days post treatment[a]								
Item	p.m. 1	a.m. 2	p.m. 2	a.m. 3	p.m. 3	a.m. 4	p.m. 4	a.m. 5	Total
No. in estrus	8	9	15	9	0	3	2	1	47[b]
No. conceived to first service	6	4	12	5	0	1	1	1	30
Total % conceived									63.8%

[a]Prostaglandin injected a.m. day 0.
[b]Three heifer out of 50 did not show estrus during this period.

Effect of Sound Stress on Ovulation, Estrus, and Conception in Beef Heifers

G. Heersche, Jr., Guy Kiracofe, Mile McKee and D. R. Ames

Summary

Thirty of the 50 heifers used in estrous synchronization studies and that received prostaglandin and Syncro-Mate B to synchronize estrus were subjected to sound stress for 48 hours after prostaglandin was injected. Fifty-nine percent of 29 sound-stressed heifers that showed estrus within 5 days conceived when artificialy inseminated compared with 72 percent of 18 nonstressed heifers.

Introduction

Recent data in sheep indicate that exposing ewes to sound stress shortly before estrus increases ovulation but that does not affect conception rate or maintenance of pregnancy. We studied sound-stressed heifers.

Experimental Procedure

Fifty heifers received ear implants of Syncro-Mate B which were removed 7 days later. At implant removal, heifers were injected intramuscularly with 30 mgs of prostaglandin. Thirty of the 50 heifers were immediately placed in a barn and exposed to 8,000 H_z pure tones at 90 decibles intensity. The other 20 were protected from the sound (controls). The sound was played intermittently with the sound on 2 minutes and off 8 minutes. After 48 hrs of exposure, all heifers were returned to pens and bred 12 to 18 hours after the onset of estrus. Two weeks after the prostaglandin injection, sound-stressed and control heifers were rectally palpated to determine number of ovulations that had occurred at the last estrus. Numbers of corpora lutea on the ovaries were recorded as the number of ovulations. All heifers were pregnancy diagnosed 65 and 95 days after breeding.

Results and Discussion

Occurrence of estrus and conception rate are reported in Table 17.1. Rectal palpation gave no evidence that sound treatment affected ovulation rate. Onset of estrus occurred over a similar period of time and the duration of estrus was the same for sound stressed and control heifers. A lower percentage 959%) of heifers conceived in the sound-stressed group (17 of 29) than in the control group (72% or 13 of 18); however, work is needed to determine if sound caused the difference.

Table 17.1. Time of Estrus and First Service Conception Rate for Sound Stressed and Control Heifers

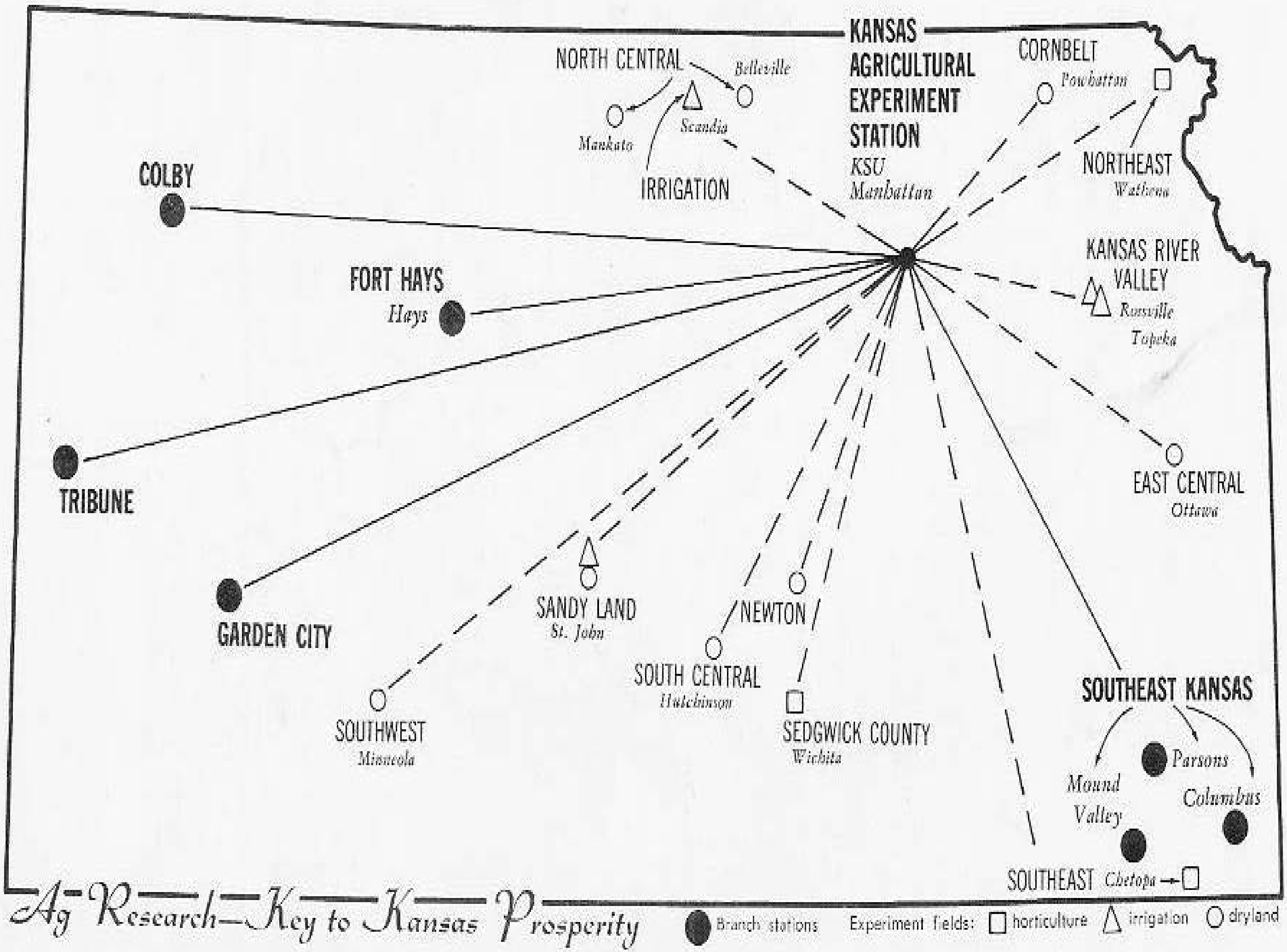
Item	Days after prostaglandin injected								Totals
Heifers	pm 1	am 2	pm 2	am 3	pm 3	am 4	pm 4	am 5	
No. Controls pregnant from first service	3	3	2	2	0	1	1	1	13
No. sound stressed in estrus	4	4	12	7	0	1	1	0	29[a]
No. Controls in estrus	4	5	3	2	0	2	1	1	18[b]
No. sound stressed pregnant from first service	3	1	10	3	0	0	0	0	17

[a]One heifer was not synchronized (estrus, am day 7).
[b]One heifer was not in estrus until day 19, another heifer did not show estrus.

ACKNOWLEDGMENTS

The Department of Animal Science & Industry appreciates the support of the following in beef cattle research during the past year.

AID (Agricultural Industrial Development)	Wichita, Kansas
Achilles Cattle Company	Manitoba, Canada
Arkansas Valley Feeders	Arkansas City, Kansas
Ag-Tronic, Inc.	Hastings, Nebraska
American Cyanamid Company	Princeton, New Jersey
Automatic Equipment Company	Pender, Nebraska
Bill Barr	Leoti, Kansas
Barrett-Hughes Feedlot	Emporia, Kansas
Les Bilter	Eureka, Kansas
Bob's Flying Service	Waverly, Kansas
Briarhill Angus Farm	Union Springs, Alabama
Brookover Feed Yards, Inc.	Garden City, Kansas
Jim and Byron Brooks	Manhattan, Kansas
Butler Mnaufacturing Company	Kansas City, Missouri
Celanese Chemical Company	Corpus Christi, Texas
C. K. Processing Co., Inc.	Manhattan, Kansas
Commercial Solvents Corp.	Terre Haute, Indiana
H. C. Davis & Sons Manufacturing Co.	Bonner Springs, Kansas
Dodson Manufacturing Co.	Wichita, Kansas
Elanco Products Company	Indianapolis, Indiana
Farmers Coop Association	Manhattan, Kansas
Farmland Industries	Kansas City, Missouri
Field Queen Corp. (Div. of Hesston, Corp.)	Maize, Kansas
Flint Hills Beef Feeders, Inc.	Potwin, Kansas
Garden City Coop	Garden City, Kansas
Glenkirk Farms	Maysville, Missouri
W. R. Grace and Company	Clarksville, Maryland
Hawk Bilt Company	Vinton, Iowa
Hawkeye Steel Products, Inc.	Waterloo, Iowa
Hays Land & Cattle Co., Inc.	Hays, Kansas
Heizer By Products, Co.	Great Bend, Kansas
Hi-Plains Enterprises, Inc.	Leoti, Kansas
Ingalls Feed Yard	Ingalls, Kansas
Inject-O-Meter Mfg. Co.	Clovis, New Mexico
Iowa Beef Inc.	Emporia, Kansas
Jarbai-Lackey Feedyard	Parsons, Kansas
Kansas Beef Industries (Circle E. Division)	Potwin, Kansas
Kansas Sun Cattle Feeders, Inc.	Leoti, Kansas
Kearney Co. Feeders, Inc.	Lakin, Kansas
Laflin Ranch	Olsburg, Kansas
L-B Cattle Company	Arkansas City, Arkansas
Master Feeders II, Inc.	Garden City, Kansas
Merck and Company	Rahway, New Jersey
Morton Salt Company	Kansas City- Missouri
Myzon Laboratories, Inc.	Des Moines, Iowa
Ohio Medical Products	Madison, Wisconsin
Charles Pfizer & Company	Bonner Springs, Kansas
Pratt Feedlot, Inc.	Pratt, Kansas
Roskamp Roller Mills	Waterloo, Iowa
Salina Concrete Products, Company	Salina, Kansas
Salisbury Harvestore	Kansas City, Missouri
Schering Corporation	Bloomfield, New Jersey
G. D. Searle Company	Chicago, Illinois
Shell Chemical Company	San Ramon, California
Sir William Farm	Hillsdale, New York
Six (6) N Ranch	Council Grove, Kansas
Spencer-Fairleigh Cattle Company, Inc.	Scott City, Kansas
Thies Packing Company	Great Bend, Kansas
U. S. Steel Agri-chemical Division	Kansas City, Missouri
Upjohn Company	Kalamazoo, Michigan
Walnut Hill Feed Yards, Inc.	Great Bend, Kansas
Ward Feed Yard	Ingalls, Kansas
Wilson Certified Foods, Inc.	Kansas City, Missouri



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