concentrates or roughages were fed. The pellets made up the sole source of concentrates and roughages received during the fattening period. At the end of the 135-day fattening period the heifers were sold on a grade and yield basis.

The indicated ratios of sorghum grain to dehydrated alfalfa in pellet form were compared.

Chemical analyses of the pellets also are indicated:

Lot number	Sorghum grain	Dehy. alfalfa	Protein	Ether extract	Crude fiber	Moisture	Ash	N.F.E.	Carbohydrates
%	%								
1	90	10	10.13	3.32	4.03	9.88	2.36	70.28	75.31
2	70	30	11.56	3.32	7.62	8.97	3.51	65.02	72.64
3	50	50	12.75	3.52	13.05	8.61	5.15	56.92	69.97
4	30	70	15.63	3.57	15.80	7.72	6.81	50.47	66.27
5	10	90	16.59	3.61	20.57	7.23	7.52	46.32	66.89

Observations

The heifers in all lots went on full feed without difficulty and in about 20 days all lots were being fed pellets ad lib, with their average daily pellet consumption being within ½ to 1 pound of the average daily consumption for the entire 135-day fattening period. All the cattle stayed on feed very well; however, bloat was experienced in some lots. Practically all of the heifers in lots 1 and 2 getting 90:10 and 70:30 ratios of sorghum grain to dehydrated alfalfa, respectively, experienced some degree of bloat almost every day. The most bloat occurred from 9 to 10 a.m. and from 5 to 7 p.m. The heifers in lots 3, 4, and 5 rarely bloated, with lots 4 and 5 having no bloat at all. From our observations, the frequency of bloat decreased as the amount of dehydrated alfalfa increased from 30 to 90 percent of the total ration.

The heifers in all lots were restless, especially those in lots 1, 2, and 3. Those in lots 4 and 5 appeared more content and were observed to ruminate frequently. Without exception, all heifers indicated a desire for fiber by chewing and eating the board fences.

The feedlot performance and carcass data are presented in Table 5. The data presented reveal the following:

1. The average daily gain made by the different lots of heifers was not significantly different.
2. Daily pellet consumption per head increased as the dehydrated alfalfa increased, with the heifers in lot 5 eating about 3 pounds of pellets more per head daily.
3. Lot 1 required less feed per pound of gain followed by lots 3, 4, 2, and 5.
4. Lot 1 made the most economical gain.
5. The high cost of gain made in lots 2, 3, 4, and 5 over lot 1 was due not only to the increased feed consumption but mainly to the higher cost of the pelleted feed containing the higher percentages of dehydrated alfalfa.
6. Carcass grade scores of lots 1 and 2 are not significantly different. However, lot 1 graded significantly higher than lot 4, highly significantly higher than lot 3, and highly significantly higher than lots 4 and 5.
7. These data indicate that as the roughage portion (dehydrated alfalfa) of this all-pellet fattening ration was increased the following occurred:
   (a) Average daily gain did not change significantly.
   (b) Average daily feed consumption increased markedly.
   (c) Feed required per cwt. gain increased.
   (d) Carcass grade decreased significantly.
8. The quality of carcass fat was not affected by the level of dehydrated alfalfa in the fattening ration. The carcass fat of the cattle from all lots was very firm and the desirable white to creamy-white.

Table 5

Performance of yearling beef heifers fed various ratios of sorghum grain to dehydrated alfalfa in pellet form. A progress report.

May 17, 1960, to September 30, 1960—135-day fattening period.

Lot number	1	2	3	4	5
Number heifers per lot	9	10	9	10	10
Sorghum grain: Dehydrated alfalfa ratio	90:10	70:30	50:50	30:70	10:90
Av. initial wt., lbs.	670	655	659	653	666
Av. final wt., lbs.	908	879	920	909	899
Av. gain per heifer, lbs.	238	224	261	256	233
Av. daily gain per heifer, lbs.	1.76	1.66	1.93	1.89	1.73
Av. daily ration per heifer, lbs:					
Sorghum grain	13.91	11.81	8.76	5.32	1.86
Dehydrated alfalfa	1.55	5.06	8.77	12.40	16.75
Lbs. pellets consumed daily, total	15.46	16.87	17.53	17.72	18.61
Lbs. feed per cwt. gain:					
Sorghum grain	789.20	711.56	453.44	280.27	107.85
Dehydrated alfalfa	87.69	304.95	453.45	653.98	970.69
Total lbs. feed per cwt. gain	876.89	1016.51	906.89	934.25	1078.54
Feed cost per cwt. gain[1]	$18.41	22.87	21.31	22.89	28.07
Carcass data grades, USDA:[2]					
Av. choice	1	2	2	..	..
Low choice	2	5	1	..	..
High good	2	1	1	3	..
Av. good	3	2	..	2	3
Low good	1	..	3	4	5
High standard	..	..	2	1	2
Av. carcass grade[4]	17.9	18.7	17.1	16.7	16.1
Value per head on carcass grade-yield basis[3]	196.50	192.54	189.20	177.64	172.38

1. Pellet price on last page of bulletin.
2. Av. choice = 20; low choice = 19; high good = 18; av. good = 17; low good = 16; high standard = 15.
3. Choice grade carcasses = $38 per cwt.; good grade carcasses = $35.50; standard = $32.
4. Grade significance: $P < 0.05$ = 17.9 over 16.7; 18.7 over 17.1.
   $P < 0.01$ = 17.9 over 16.1; 18.7 over 16.7 and 16.1.

Experimental Grubicide Application Methods to Control Cattle Grubs.

F. W. Knapp and Miles McKee

During the past year a new grubicide application method has been tested for use in controlling cattle grubs. Called the pour-on method, it consists of pouring a small amount of a special formulation of a systemic grubicide along the back line of an animal before grubs appear in the back.

Three experimental systemic compounds tested were Bayer 29493, Co-

Ral, and Dylox, also called Dipterex.[1] These compounds were in mineral oil as a 2 percent suspension except Dylox was an 8 percent suspension.

The animals used were the University's purebred cow and calf herd, ranging in age from 1 to 15 years. They were divided into six groups and treated as follows:

Group 1. 15 head, 250 cc of B-29493 per head October 11, 1960.
Group 2. 15 head, untreated controls for group 1.
Group 3. 29 head, 250 cc of Dylox per head November 1, 1960.
Group 4. 25 head, untreated controls for group 2.
Group 5. 14 head, 250 cc of Co-Ral per head October 11, 1960.
Group 6. 14 head, untreated controls for group 5.

A pint jar with a 250-cc mark was used to apply insecticides to animals' backs. After treatment the animals were grouped as necessary for the convenience of the herdsman.

Not all animals in each group were available for grub counts due to consignment for shows and sales. Past experiments indicated that most grubs are encysted in backs by February; therefore, only one count was made February 1, 1961.

Table 6

The value of a pour-on grubicide application for grub control.

Group	Treatment	No. animals treated	No. animals checked for grubs	No. animals infested	Total grubs found	Av. grubs per head	% grub reduction
1	B-29493	15	11	3	3	0.3	90
2	untreated	15	15	7	45	3.0	
3	Dylox	29	11	0	0	0	100
4	untreated	25	25	12	76	3.0	
5	Co-Ral	14	10	10	313	31.3	24.6
6	untreated	14	8	8	332	41.5	

Results and Discussion

All three pour-ons in mineral oil were quite viscous the day of application due to cool weather and viscocity of the oil used. Newer formulations are less viscous and more easily applied.

No ill effects to the animals were noted nor was there any damage to the hair coat at the site of application. Treated animals could easily be distinguished from untreated by the residue of mineral oil along back lines.

The control of grubs by the B-29493 and Dylox treatments was 90 and 100 percent, respectively, and considered very effective. The Co-Ral treatment, however, gave only 24.6 percent control. Other workers using Co-Ral in a less viscous carrier have reported effective control.

Conclusions

The application of a grubicide by a pour-on method requires less time, labor, and equipment than either bolus or spray treatment. Another advantage over the spray method is that the pour-on treatments can be applied under adverse weather conditions. This work is still experimental and will require more testing before complete approval.

1. Bayer 29493 (0, 0 - dimethyl 0 - 4 - (methylthio) -m- tolyl phosphorothioate)
Co-Ral (0, 0 diethyl 0 - 3 - chloro - 4 - methyl - 2 -oxo-2H-1- benzopyran-7yl phosphorothioate)
Dylox (0, 0 - dimethyl- 2, 2, 2- trichloro -1- hydroxyethyl phosphate)
Insecticides were furnished by the Chemagro Corporation, Kansas City, Mo.

A Comparison of Salt-protein Blocks and Salt-protein Loose Mixtures for Steer Calves on Winter Bluestem Pasture, 1959-60 (Project 253-1).

E. F. Smith, F. W. Boren, and B. A. Koch

Salt-meal mixtures, with enough salt to limit protein intake, have been used for some time to supply protein on a self-service basis to range cattle. By pressing the salt-protein mixture into block form there is the possibility of limiting intake mechanically and thereby reducing the salt content of the mixture, which would be desirable.

The following experimental treatments were compared:

Pastures 7A and 13. Salt and soybean meal mixture.
Pastures 7B and 15. Salt and soybean meal in block form.

The mixtures or blocks listed above were kept before the steers throughout the winter period. Molasses was included as a binding agent in the blocks, so it was also included in the mixtures. Bonemeal was included in both blocks and mixtures as a source of phosphorus.

The bluestem pastures, each containing 60 acres, had sufficient dry grass for the cattle.

The 40 steer calves, 10 per pasture, used in the experiment were Good to Choice grade Herefords from near Fort Davis, Texas, and were assigned on a random weight basis to their treatments.

Observations

Salt content in both blocks and loose mixtures was varied in attempting to maintain consumption of the supplemental feed at the same level for all lots. Salt content of the blocks varied from 0 to 20 percent and that of the loose mixtures from 10 to 22 percent. Consumption was easier to regulate with the salt-protein mixture because the ratio could be changed easily. By the end of the first two weeks the cattle on both blocks and mixture were consuming 20 percent salt. Salt required to limit intake ranged between 0.43 pound and 0.48 pound per steer daily. The blocks contributed very little toward lowering salt consumption. The performance of the steers was about the same under both treatments.

Table 7

A comparison of salt-protein blocks and salt-protein mixtures.

December 8, 1959, to April 27, 1960.

Pasture number	7A	13	7B	15
Treatment	Mixture	Mixture	Block	Block
Number of steers	10	10	10	10
Initial weight, lbs.	455	459	456	451
Daily gain per steer	0.23	0.27	0.11	0.18
Daily ration per steer, self-fed, lbs.:				
Soybean meal	1.64	1.67	1.74	1.68
Salt	0.48	0.48	0.44	0.43
Bonemeal	0.08	0.08	0.12	0.12
Molasses	0.06	0.06	0.12	0.12
Total	2.26	2.29	2.42	2.35
Bluestem pasture	(free choice)		(free choice)	

The Value of Diethylstilbestrol Implants[1] and Implants Plus an Antibiotic[2] for Wintering Steer Calves, 1960-61 (Project 253-6).

C. L. Drake, E. F. Smith, B. A. Koch, D. Richardson, and F. W. Boren

Thirty-four good-to-choice Hereford steer calves from near Alpine, Texas, were randomly assigned (Snedecor's[3] randomization table) to three treatments:

Lot 19. Control.

Lot 20. Each steer implanted with 24 mgs. of diethylstilbestrol in the right ear.

Lot 21. Each steer implanted with 24 mgs. of diethylstilbestrol in the right ear and fed 70 mgs. of Aureomycin daily, mixed with sorghum grain.

Each animal in each lot received daily 5 lbs. of sorghum grain, 4 lbs. of alfalfa hay, and prairie hay free choice. They will be grazed and fattened during the summer and fall of 1961. Some will be reimplanted with diethylstilbestrol to collect more information on its use in a wintering, grazing, and fattening program.

Observations

Weight gains were not significantly affected by either stilbestrol implants or Aureomycin; however, the combination treatment administered to lot 21 apparently reduced the feed required per 100 lbs. of gain compared with the controls (lot 19).

Table 8

The value of diethylstilbestrol implants with and without chlortetracycline (aureomycin) for wintering steer calves.

December 2, 1960, to March 24, 1961—112 days.

Treatment	Control	Stilbestrol implant	Stilbestrol implant and Aureomycin
Lot number	19	20	21
Number of steers	14	10	10
Initial wt. per steer, lbs.	536	521	520
Daily gain per steer	0.95	1.01	1.08
Standard error of mean	.06	.04	.08
Daily ration per steer, lbs.:			
Sorghum grain	5.0	5.0	5.0
Alfalfa hay	4.0	4.0	4.0
Prairie hay	8.7	8.0	8.1
Salt (free choice)	.....	.....	.....
Stilbestrol implant, 24 mgs.	No	Yes	Yes
Aureomycin, 70 mgs. per head daily	No	No	Yes
Feed per cwt. gain, lbs.:			
Sorghum grain	523	493	457
Alfalfa hay	418	395	370
Prairie hay	927	791	748

A Comparison of Feeding Hay to Steers on Bluestem Pasture and in Drylot, 1960-61 (Project 253-2).

C. L. Drake, E. F. Smith, F. W. Boren, and B. A. Koch

This study was designed to compare winter bluestem pasture with drylot as a place to winter calves. The same ration, alfalfa and prairie hay, was fed to both groups.

1. Diethylstilbestrol implants (Stimplants) were furnished by Chas. Pfizer and Co., Inc., Terre Haute, Ind.

2. Chlortetracycline (Aureomycin) was furnished by the American Cyanamid Co., Pearl River, N.Y.

3. George W. Snedecor. Statistical Methods. Iowa State University Press, Ames, Iowa (1959).

The following experimental treatments were used:

Pasture 8. Fourteen steers wintered in a 139-acre bluestem pasture from December 2, 1960, to March 24, 1961, and fed 4 pounds of alfalfa hay per head daily. Prairie hay and salt were offered free choice.

Lot 22. Fourteen steers wintered in a drylot 50 x 120 feet, without shelter and fed the same as those in pasture 8.

Observations

The results of this test are shown in Table 9. The steers in drylot consumed 2 pounds more prairie hay per head daily and gained slightly more than those wintered on bluestem pasture; however, the difference in gain was not statistically significant.

These steers will be grazed together this summer to determine the influence of different regimes on summer grazing gains.

Table 9

A comparison of feeding hay to steers in drylot and on bluestem pasture.

December 2, 1960, to March 24, 1961—112 days.

Lot number	22	8
Number of steers per lot	14	14
Feeding area	Drylot	Bluestem pasture
Initial wt. per steer, lbs.	490	512
Daily gain per steer	0.41	0.32
Standard error of mean	.03	.03
Daily ration per steer, lbs.:		
Alfalfa hay	4.0	4.0
Prairie hay	10.2	8.3
Salt (free choice)	.....	.....
Bluestem pasture	No	Yes

Different Methods of Managing Bluestem Pastures, 1960 (Projects 253-3 and 253-5).

E. F. Smith, K. L. Anderson, B. A. Koch, F. W. Boren, and C. L. Drake

This experiment was designed to determine the effect of different stocking rates, of deferred grazing, and of pasture burning on cattle performance, productivity of pastures, and range condition as determined by plant population changes. In addition to the yearly report, a summary of cattle gains for the past 11 years of the study is included.

Experimental Procedure

Two-year-old Hereford steers with an average USDA feeder grade of high good were used to stock the pastures in 1960. They had been purchased as calves from near Fort Davis, Texas, and were used in this experiment in 1959 as yearlings. During the winter of 1959-60, prior to this grazing trial, they were fed sorghum silage and alfalfa hay in drylot until about March 1 when they were moved to a bluestem pasture where they were fed alfalfa hay until the grazing season started.

The experimental treatment for each pasture was:

Pasture 1. Moderate stocking rate, 3.7 acres per steer.

Pasture 2. Overstocked, 2.6 acres per steer.

Pasture 3. Understocked, 5.4 acres per steer.

Pastures 4, 5, and 6. Deferred grazing at the moderate stocking rate, 3.7 acres per steer. All steers were grazed on pastures 4 and 6 from May 4 to July 6. They were then moved to pasture 5 where they remained until September 8. From this date until September 29 they were allowed to graze in all three pastures.

Pasture 9. Burned April 7, 1960, moderate rate of stocking.

Pasture 10. Burned April 7, 1960, moderate rate of stocking.

Pasture 11. Burned May 4, 1960, moderate rate of stocking.