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TALLOW, BARLEY AND STILBESTROL FOR STEERS FED GREEN-CHOPPED ALFALFA

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TALLOW, BARLEY, AND STILBESTROL FOR STEERS FED GREEN-CHOPPED ALFALFA[1]

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Summary

Steers fed green-chopped alfalfa and small amounts of cotton gin trash were supplemented with tallow and barley throughout a growing and fattening period. In addition, half the number of steers fed each diet were implanted with stilbestrol.

Growing Period:

1. Average daily gains were progressively increased with barley and tallow; feed efficiency was in accord.

2. Stilbestrol significantly increased gains 0.5 pounds per head daily regardless of the type of ration.

Fattening Period:

1. Significantly faster gains were made on steers fed tallow rather than barley.

2. Higher levels of each supplement produced significantly faster gains than lower levels.

3. Stilbestrol resulted in increased gains. Although implanted steers fed no concentrates failed to show increased gain, high-tallow fed implanted animals gained 1.18 pounds per head per day faster.

Tallow supplements produced a higher dressing percent and carcass grade. Stilbestrol resulted in a significantly higher carcass grade. During 92 days of the growing and fattening periods, 860 cases of bloat were observed in 59 steers. The severity as well as the incidence of bloat was markedly reduced by tallow feeding.

Introduction

Green-chop feeding programs are common in most high alfalfa producing areas. In general practice, large amounts of green-chop must be fed to result in an economic program. Therefore, consideration was given to using the minimum amount of supplement in making maximum gains. In general, freshly chopped alfalfa contains more protein than the steer requires and contains probably the best mineral balance of any naturally occurring feeding-stuff. Consequently, energy might be the limiting nutrient for maximum gains.

1/Green-chopped alfalfa is the same as alfalfa soilage.

2/The stilbestrol implants used in this experiment were furnished by Chas. Pfizer & Co., through the courtesy of W. C. Sherman.

3/Authors acknowledge statistical assistance of H. Tucker, Experiment Station Statistician.

4/Authors acknowledge the cooperation of G. E. Blackwell, P. Lineberry, and C. Jones in obtaining carcass grades.

Because of declining inedible animal fat markets in the last few years, a surplus of fat such as tallow has resulted. Consequently, the price of tallow has been reduced to a level where it can be considered as a feed for livestock. Fat is being used in the feed industry today, but primarily in dog and poultry rations. The fact that tallow contains 2.25 times the energy per unit weight of carbohydrates lends itself to a possible supplement for green-chop feeding programs.

Green-chop programs containing animal fats may also help control bloat. A New Zealand experiment showed some benefit when vegetable oil sprays were used for pasture bloat in cattle.

This experiment then, was to determine any possible benefits by increasing gains and controlling bloat from feeding tallow and barley, and implanting stilbestrol.

Procedure

Seventy-two yearling Hereford steers were randomly allotted to 12 pens of six animals each. The experimental period was divided into an 89 day growing phase (A) and 98 day fattening phase (B). Alfalfa was fresh field-chopped twice daily and fed free choice to all steers throughout both periods.

Phase A:

Initially, half the number of steers (3) in each pen were implanted with 36 mgs. of stilbestrol. The barley and fat supplement shown in Table I was fed during this period at the rate of 0.9 pounds per 100 pounds body weight to eight pens of steers. To the remaining four pens of steers cotton gin trash was fed at about the same level as the trash intake of the other supplemented animals. This level was approximately 0.3 pounds per 100 pounds body weight. Each supplement was fed twice daily. The animals were weighed individually each month and the amount of supplement was adjusted in accord to body weight.

Phase B:

The amount of barley and fat supplement was increased to 1.5 pounds per 100 pounds body weight daily to half the number of pens (2) that received each supplement. The barley supplement was also fed to two pens (1.5 pounds per 100 pounds body weight) that had previously received only gin trash. The level and type of supplement fed to the remaining steer groups were unchanged. The amount of supplement fed was adjusted periodically in accord to body weight. The alfalfa soilage consumption and moisture content was recorded to determine the relative dry matter intake of the steers.

The steers were marketed by weight at about 1000 pounds. After a 12 hour stand each steer was weighed off experiment. The steer was slaughtered the same day that the final weight was obtained. Carcass data included grade, dressing percentage based on final live weight, and cold carcass weight.

During this study, bloat observations were made during daylight hours on the ten pens of steers receiving tallow and barley supplements and gin trash throughout both Periods A and B. Because bloat occurred in a definite period, only

observations from January 1 to April 2 were considered. Since bloat manifests itself in varying degrees of severity, an index of severity was established. Numbers 1, 2, 3 and 4, were ascribed to the increasing severity of bloat; Number 1 being milk bloat and Number 4 being death that resulted from bloat. Figure 1 illustrates the index of severity used as a measurement in this study.

TABLE I: CONSTITUENTS OF SUPPLEMENTS FOR ALFALFA SOILAGE

	Supplement Designation	
Constituent	Barley	Fat
[a]Cotton Gin Trash	31.5	31.5
Molasses	3.5	3.5
Barley	63.0	51.0
Tallow	----	12.0
Salt	2.0	2.0
% Chemical Constituents:		
Crude Protein	7.69	7.13
Crude Fiber	13.7	13.2
Ether Extract	4.4	17.8

[a]Cotton gin trash is the waste product from cotton gins and contains leaves, stems, lint and some seeds.

Cost of supplements were based on the following ingredient costs per ton: cotton gin trash, $6; molasses, $40; barley, $60; tallow, $140; salt $40; processing, $4.

Results and Discussion

Growth and Feed Utilization

Period A:

Results of the 89 day growing period are shown in Table II. During this period increased rate of gain was highly significant in the stilbestrol implanted animals. No ration-stilbestrol interaction was found. That is, the rates of gain were increased approximately 0.5 pounds per steer daily regardless of the type of diet.

When 12 percent of the barley was replaced by 12 percent tallow, the average fat consumption per steer during this period was approximately 0.8 pounds daily. The fat supplement significantly increased the average gains 0.36 pounds and 0.78 pounds more, respectively, than with the barley and gin trash supplemented groups of steers.

Table II also shows that feed efficiency was increased in the fat-fed groups while the dry matter intake was lower in the groups of animals unsupplemented with barley or tallow.

TABLE II: AVERAGE DAILY GAIN AND FEED EFFICIENCY AS INFLUENCED BY SUPPLEMENTATION DURING PERIOD A

	Supplement Designation		
	Fat	Barley	Gin Trash
Treatment Numbers	1 and 2	3 and 4	4 and 5
Lbs. Supp./100 lbs. body wt.	0.9	0.9	0.3
No. Steers	22	24	20
Av. Initial Wt.			
Stilbestrol	582	586	611
No Stilbestrol	589	613	609
Av. Final Wt. Period A			
Stilbestrol	835	808	797
No Stilbestrol	795	785	742
Av. Daily Gain			
Stilbestrol	2.84	2.49	2.09
No Stilbestrol	2.31	1.93	1.49
Lbs. Alfalfa Soilage/Steer/Day			
Fresh	50.6	51.7	60.6
Dry	12.45	12.57	14.70
Lbs. Supp./Steer/Day	5.82	5.97	2.08
Lbs. D.M./Steer/Day	18.17	18.54	16.78
Lbs. D.M./100# Gain	715	828	939
*Cost/Head/Day (cents)	33.2	31.2	21.8
Cost/lb. Gain (cents)	12.5	14.1	12.2

*Estimated cost of feed/ton: Green-Chop Alfalfa, $7; Cotton Gin Trash, $6; Barley Supplement, $43.80; Fat Supplement, $53.40.

Period B:

Table III shows daily gain and feed efficiency with different supplements during the fattening phase. Steers supplemented with tallow gained significantly faster than the barley-fed steers. The high level lots (2 and 4) gained faster

than the low level tallow and barley lots (1 and 3). Also, steers in lot 6 (gin trash followed by high level barley) gained significantly faster than lot 5 on gin trash alone.

The use of stilbestrol implants in Period A shows a big increase in gain over non-implanted steers except for the gin trash steers. Response to implanting parallels the amount of energy in the supplement, with the greatest advantage in the high fat lot (1.18 pounds increase). A long time stilbestrol response was shown with an initial high roughage growing ration followed by a high concentrate finishing ration.

Feed efficiency followed the rate of gain pattern, with the high fat supplemented steers being the most efficient.

Combined Phases A and B:

Table IV and V show the data for combined Periods A and B. The feeding of tallow resulted in significantly faster gains than did the barley supplement. Fat and barley supplements also produced significantly faster gains than did only gin trash.

However, similar gains were found in animals fed low barley (treatment 3) as in those fed gin trash for 89 days and high barley thereafter (treatment 6). Significantly faster gains are shown in Table IV for those treatments where steers were fed high levels of tallow and barley during the fattening phase than the animals that continued on the low level supplements. The initial 36 mg. stilbestrol implant resulted in a significant increased gain. Increased stilbestrol response occurred in the fat-fed steers compared to those animals fed barley, and more response showed in steers fed the high compared to the low-level of tallow. The least response to stilbestrol was with steers not receiving concentrate supplement at any time.

TABLE III. RATES OF GAIN AND FEED EFFICIENCY AS INFLUENCED BY SUPPLEMENTATION DURING PERIOD B

	Supplement Designation					
	Fat	Fat	Barley	Barley	Gin Trash	Barley
Treatment Numbers	1	2	3	4	5	6
Lbs. Supp./100 lbs. body wt.	0.9	1.5	0.9	1.5	0.3	1.5
Av. Initial Wt. Period B:						
Stilbestrol	789	881	819	805	793	800
No Stilbestrol	786	804	791	780	720	769
Av. Daily Gain:						
Stilbestrol	2.54	3.60	2.34	3.02	2.17	2.94
No Stilbestrol	2.23	2.42	2.02	2.27	2.17	2.36
Lbs. Alfalfa/Steer/Day						
Fresh	49.6	41.5	49.3	41.4	76.9	45.9
Dry	11.7	9.6	11.6	9.5	18.4	10.7
Lbs. Supp./Steer/Day	7.8	12.9	7.6	12.4	2.6	13.0
Lbs. D.M./Steer/Day	19.5	22.5	19.2	21.9	21.0	23.7
Lbs. D.M./100 lbs. Gain	809	735	873	799	942	849
Cost/Steer/Day	38.2	48.9	34.0	40.7	27.7	44.7
Cost/100 lbs. Gain	16.1	16.5	15.6	15.3	12.7	16.9

Carcass Data

The steers were marketed between 950 and 1050 pounds. However, some steers from the unsupplemented group were slaughtered after 187 days, regardless of weight. The number of days to market weight is shown in Table IV. Because of differences in starting weight only large difference in days to market are significant. Such a difference existed between treatments 1 and 2. Steers fed high fat diets during the fattening period (Period B) were marketed in less time than the low fat feeding steers. Also, less time was required for stilbestrol implanted steers to reach market weight.

Dressing percentages were based on cold carcass weight and the final experimental live weight. Thus, all dressing percentages were low, but the relationship of one percentage to any other still holds true. Federal grades were not available, so carcasses were graded by four competent individuals.

The stilbestrol implanted steers graded higher than non-implanted steers, despite the fact they were "on feed" less days than the control cattle. This fact is contrary to popular opinion and other experimental work. However, these steers were implanted at lighter weights and fed longer than most other studies. Implanting prior to the growing period instead of the finishing period may eliminate the reduced grades from implanting steers the last 100 to 120 days before slaughter.

Incidence of Bloat

Figure 2 graphically illustrates the total incidence of bloat by days. It can be readily noted that bloat was during a definite period. Figure 3 shows the total number of bloats per steer on different rations during both Period A (January 1 to February 5) and Period B (February 6 to April 2). The "bloat period" occurred only the last few days of Period A and mostly during Period B. Table VI shows the effect of supplements on the incidence and degree of bloat during Period A. The relative percent of total numbers of bloat (287) during Period A in those steers fed gin trash, barley, and tallow supplements were 41.3, 35.9, and 22.8 respectively. However, the severity of bloat in those animals supplemented with tallow was slightly greater than in the other groups of steers.

TABLE IV. INFLUENCE OF LEVELS OF FAT AND BARLEY SUPPLEMENT DURING PERIODS A AND B

	Supplement Designation					
	Fat	Fat	Barley	Barley	Gin Trash	Barley
Treatment Number	1	2	3	4	5	6
Lbs. Supp./100 lb. Body Wt.						
Period A	0.9	0.9	0.9	0.9	0.3	0.3
Period B	0.9	1.5	0.9	1.5	0.3	1.5
Av. Daily Gain:						
Stilbestrol	2.60	3.24	2.50	2.69	2.09	2.37
No Stilbestrol	2.27	2.36	1.93	2.15	1.82	1.92
No. Days to Market						
Stilbestrol	170.6	139.0	159.5	154.8	164.4	158.0
No Stilbestrol	175.0	160.0	180.0	164.7	179.8	171.5
Lbs. Alfalfa/Steer/Day						
Fresh	49.5	47.3	49.5	47.7	68.5	54.0
Dry	12.7	11.3	12.0	11.3	16.5	12.9
Lbs. Supp./Steer/Day	6.5	9.0	6.7	8.9	2.3	6.0
Lbs. D.M./Steer/Day	19.2	20.3	18.7	20.2	18.8	19.9
Lbs. D.M./100 lbs. Gain	790	749	861	821	922	912
Av. Final Wt.:						
Stilbestrol	996	1061	894	1004	957	1003
No Stilbestrol	978	976	975	952	916	964
1/Dressing Percent:						
Stilbestrol	59.8	58.8	59.2	58.6	56.1	57.8
No Stilbestrol	60.8	59.9	59.2	57.8	55.4	57.9
2/Grade:						
Stilbestrol	1.20	1.40	1.33	1.67	2.40	2.33
No Stilbestrol	1.50	1.67	2.16	2.16	2.60	2.50
Cost/Pound/Gain (cents)	14.4	15.0	14.4	15.0	12.6	14.9

1/Dressing percent based on final live weight and cold carcass weight.

2/Grade: 1 = high choice, 2 = medium choice, 3 = low choice.

TABLE V. ANALYSIS OF VARIANCE OF TREATMENT EFFECTS

Source	df	Mean Square: Av. Daily Gain Period II	Av. Daily Gain Periods I & II	No. Days to Slaughter	Dressing Percent	Grade
Replication	1	1.62	.040	465.0	1.1	2.17
a/Treatments:	(1)					
F vs B	1	1.05*	1.038**	157.7	153.3*	1.51*
F & B vs G	1	0.14	2.002**	444.5	109.4**	10.29**
(.9 vs 1.5)F	1	2.86**	0.650**	3432.0**	6.2	.26
(.9 vs 1.5)B	1	1.71**	0.178**	580.1	1.4	0.17
(0 vs 1.5)G	1	1.85**	0.127	287.0	20.7*	0.04
(S vs .0)	1	5.99**	5.072**	3444.5**	9.9	2.17*
(F vs B)(S vs 0)	1	.05	2.253**	20.0	5.1	0.21
(F & B vs 0) (S vs 0)	1	.34	0.048	1.5	3.6	1.76*
(.9 vs 1.5)F (S vs 0)	1	.98*	0.267**	495.0	0.1	0.01
(.9 vs 1.5)B (S vs 0)	1	.40	0.001	181.5	0.2	0.17
(0 vs 1.5)G (S vs 0)	1	.54	0.006	2.0	0.9	.00
Error	59	.24	0.044	377.7	3.2	.37

a/F = fat; B = Barley; G = Gin Trash-Barley; S = Stilbestrol; 0 = Nothing.

*P .05

**P .01

TABLE VI: THE EFFECT OF INEDIBLE ANIMAL FAT ON THE INCIDENCE AND SEVERITY OF BLOAT DURING PERIOD A

	Treatments		
	Gin Waste	Barley	Fat
Lbs. Supp./100# Body Wt.	0.3	0.9	0.9
No. Steers Included	12	24	23
Av. Initial Wt.	686	714	713
No. Days Included	36	36	36
No. Steer Days	414	864	795
Lbs. Alf. Soilage/Steer/Day	77.7	64.2	62.8
Lbs. Supp./Steer/Day	2.37	6.44	6.25
No. Bloat Cases	76	138	73
No. Bloat/Steer/Day	.184	.160	.102
% Bloat due to Treatment (Based on steer days)	41.3	35.9	22.8
% of Treatment Bloat due to Index:			
Number 1	52.6	54.3	41.1
Number 2	32.9	39.8	45.2
Number 3	11.8	5.9	12.3
Number 4	2.7		1.4

During Period B, 573 cases of bloat were observed during the 56 day period. Table VII shows the ration influence on bloat during this period. Tallow supplements fed at two levels greatly reduced the incidence of bloat, accounting for only 4.2 and 6.5 percent of the total number respectively. The few cases of bloat that occurred in those steers fed tallow were much less severe.

During Period B, more bloat occurred in the low-level barley supplemented groups than in any other treatment. The higher amount of dry matter in the high level barley supplement might account for less bloating than in the low barley supplement. The degree of bloat produced in the barley supplemented steers was also greater than the bloat in tallow or gin trash fed animals.

Although tallow seems promising for bloat control, more experiments, are needed before definite recommendations can be made. Furthermore, producers should realize that materials that control bloat in some areas may be ineffective in others.

TABLE VII. THE EFFECT OF INEDIBLE ANIMAL FAT ON THE INCIDENCE AND SEVERITY OF BLOAT DURING PERIOD B

	Treatments				
	Gin Trash	Barley		Fat	
Lbs. Supp./100# body wt.	.3	.9	1.5	.9	1.5
No. Steers Included	10	12	12	11	11
Av. Initial Wt.	759	805	792	787	840
No. Days Included	56	56	56	56	56
No. Steer Days	560	651	651	616	553
Lbs. Alf. Soilage/Steer/Day	79.2	50.8	43.7	52.1	43.7
Lbs. Supp./Steer/Day	2.5	7.4	12.1	7.7	12.8
No. Bloat Cases	137	222	156	24	33
No. Bloat/Steer/Day	.255	.341	.240	.039	.060
%Bloat Due to Treatment (based on steer days)	26.5	36.9	25.9	4.2	6.5
% of Treatment Bloat due to Index:					
Number 1	53.3	25.7	19.9	70.8	66.7
Number 2	32.8	34.2	36.5	25.0	27.3
Number 3	13.9	40.1	43.6	4.2	6.0

Other materials used to help prevent bloat include turpentine, household detergents, and silicones and penicillin. However, none of these "bloat preventatives" add nutrients to cattle rations. Fat can function as a nutrient to supply energy to the animal as well as a possible control from bloat. This "bloat control" might have had some influence on rates of gain between the barley and tallow supplements.

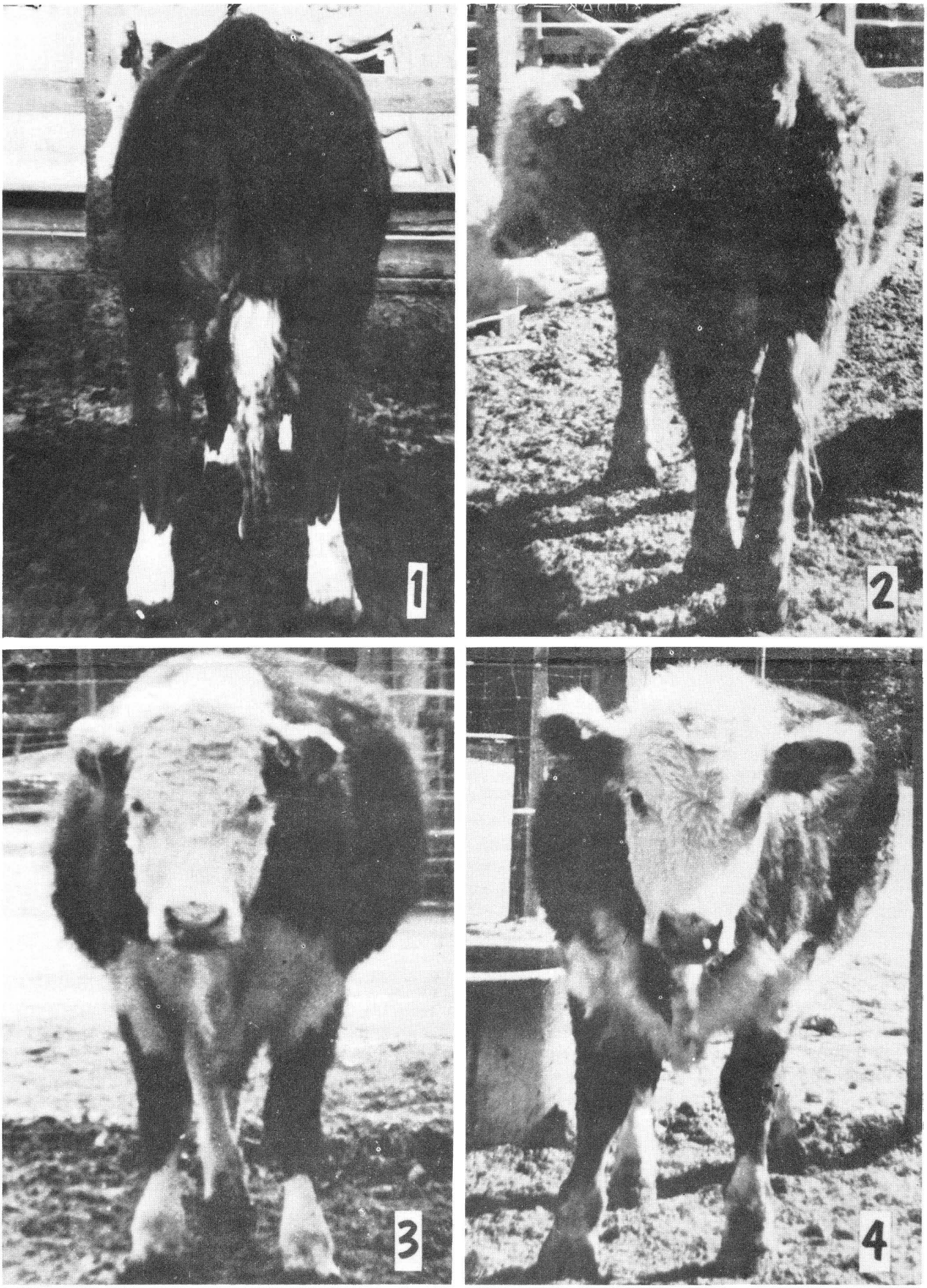

Figure 1. Pictorial representation of bloat severity index: (1) normal (2) Number 1 (3) Number 2 (4) Number 3.

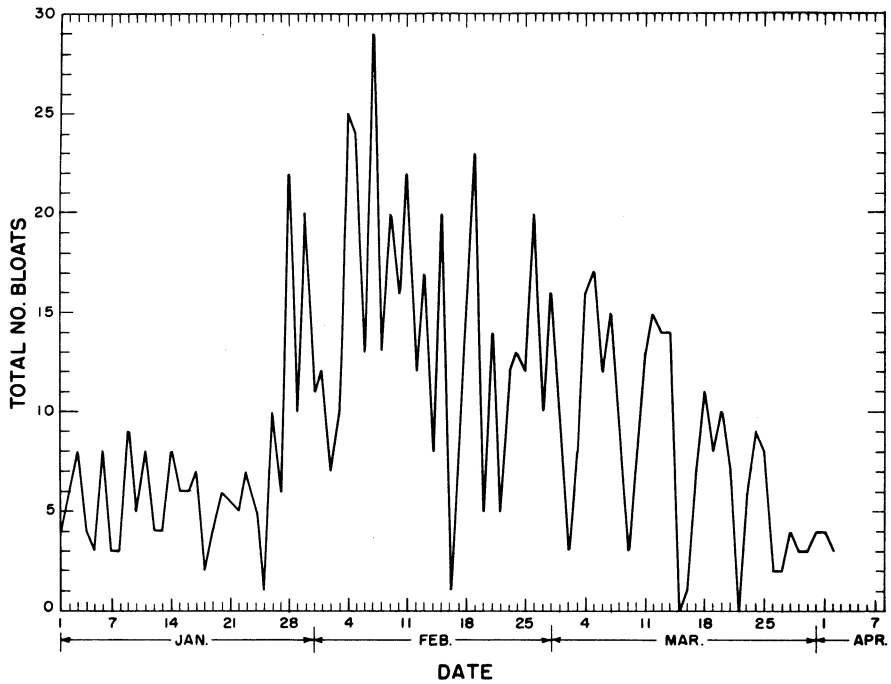

Figure 2. Seasonal influence on the incidence of bloat.

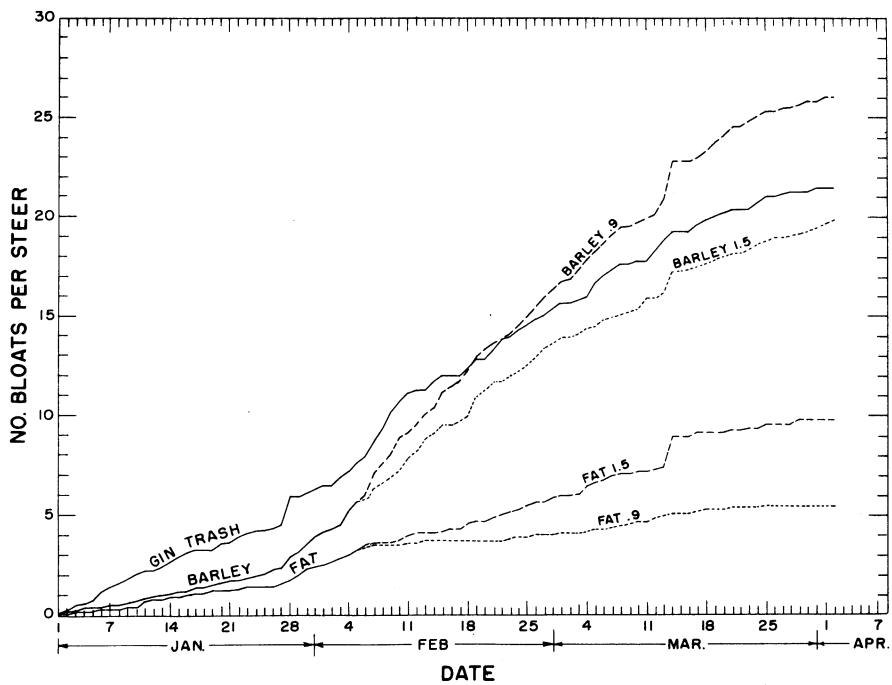

Figure 3. Accumulative number of bloat cases per steer as influenced by type and level of supplement during Periods A and B.