SECTION II

LIVESTOCK
FEEDING, BREEDING
And
MANAGEMENT TRIALS

TABLE OF CONTENTS

Cow Worming With Tramisol® and
Its Effect on Weaning Weight

By

D.G. Landblom and J. L. Nelson

Until recently, recommendations for worming cows was only made when fecal worm egg counts reached or exceeded 200 eggs per gram. Recommendations in the Midwestern part of the country are being changed based on research conducted at the U.S. Meat Animal Research Center (MARC), Clay Center, Nebraska, and the University of Nebraska's branch station located at North Platte. Scientists at these two facilities have shown an improvement in weaning weight of about 15 pounds when only cows were wormed that were shedding 15-20 eggs per gram.

With the exception of individual cases where therapeutic levels of parasitism exist, most cows in North Dakota live with a normal low level worm burden that has not been considered to be of economic importance. This adult worm burden has been measured based on fecal egg counts and ranges from 12-20 eggs per gram of feces.

To test the economic benefit from worming in terms of weaning weight, eighty-three Angus X Hereford crossbred first calf heifers and their crossbred Milking Shorthorn X Angus X Hereford and Angus X Hereford calves were randomly assigned to either a wormed or control group.

Only the cows were wormed in the treated group. Following spring processing and worming with Tramisol® (levamisole phosphate) at the rate of 2 ml/100 lbs. body weight subcutaneously on May 18th, the cow/calf pairs were turned out on crested wheatgrass pastures. Using the recommended dosage rate, worming cost per cow was $2.05. On July 15th the pairs were moved to native range pastures where they remained until November 1st.

Weight gains were monitored throughout the growing season and cows were fecal sampled at each weigh period.

Information from the investigation has been summarized in Figures 1-3, and in Table 1.

Discussion:

The number of eggs being shed in the control group drops rapidly from a high of 169 eggs per gram (epg) to 21.1 epg by July 15th, obviously, not much different than the group wormed with Tramisol®. (See Fig. 2).

This rapid reduction is known as anamanestic response by the animal to a new flush of worms. During the winter months the fourth stage larvae of Ostertagia ostertagaii, one of the major stomach worms found in North Dakota cattle, migrates into the intestinal muscosa and emerges in the spring developing into an adult intestinal worm. Normal resistance by the animal naturally lowers the worm burden to a tolerable level.

Summary:

No advantage was shown for spring worming of cows in this investigation. Average daily gains dropped progressively through the course of the grazing season as forage quality deteriorated.

Calf gains fluctuated slightly throughout the growing season, but were equal when weaned on November 1st.

A second phase of this investigation evaluates the effect of worming cows before spring turnout and calves in mid-July. Data collection in this current study will not be completed until the first of November.

Table 1. Summary of Cow and Calf Gains among Wormed and Non-Wormed Cows

	Tramisol® Wormer 1/	Control
Cows:		
No. Head	42	41
Days on Trial	167	167
Initial wt. lbs., May 18th	812	787
Final wt. lbs., Nov. 1st	977	953
Gain, lbs.	165	166
ADG, lbs.	.99	.99
Calves:		
No. Head	42	41
Days on Trial	167	167
Initial wt. lbs., May 18th	141	144
Final wt. lbs., Nov. 1st	450	449
Gain, lbs.	309	305
ADG, lbs.	1.85	1.82

Figure 1: Average Daily Gains between Routine Weighing Intervals for Wormed and Non-Wormed Cows.

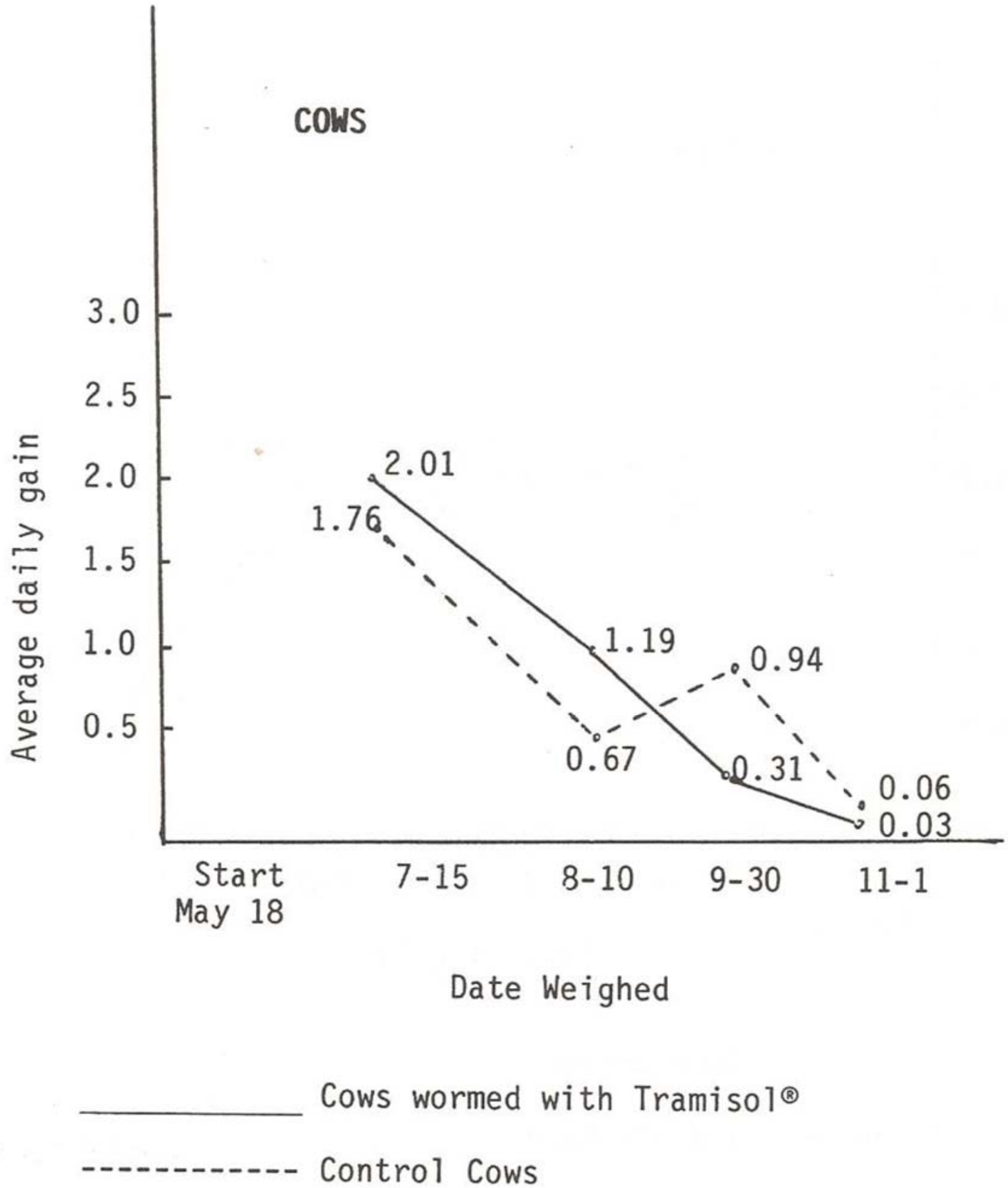


Figure 2: Average Daily Gains between Routine Weighing Intervals for Calves from Wormed and Non-Wormed Cows.

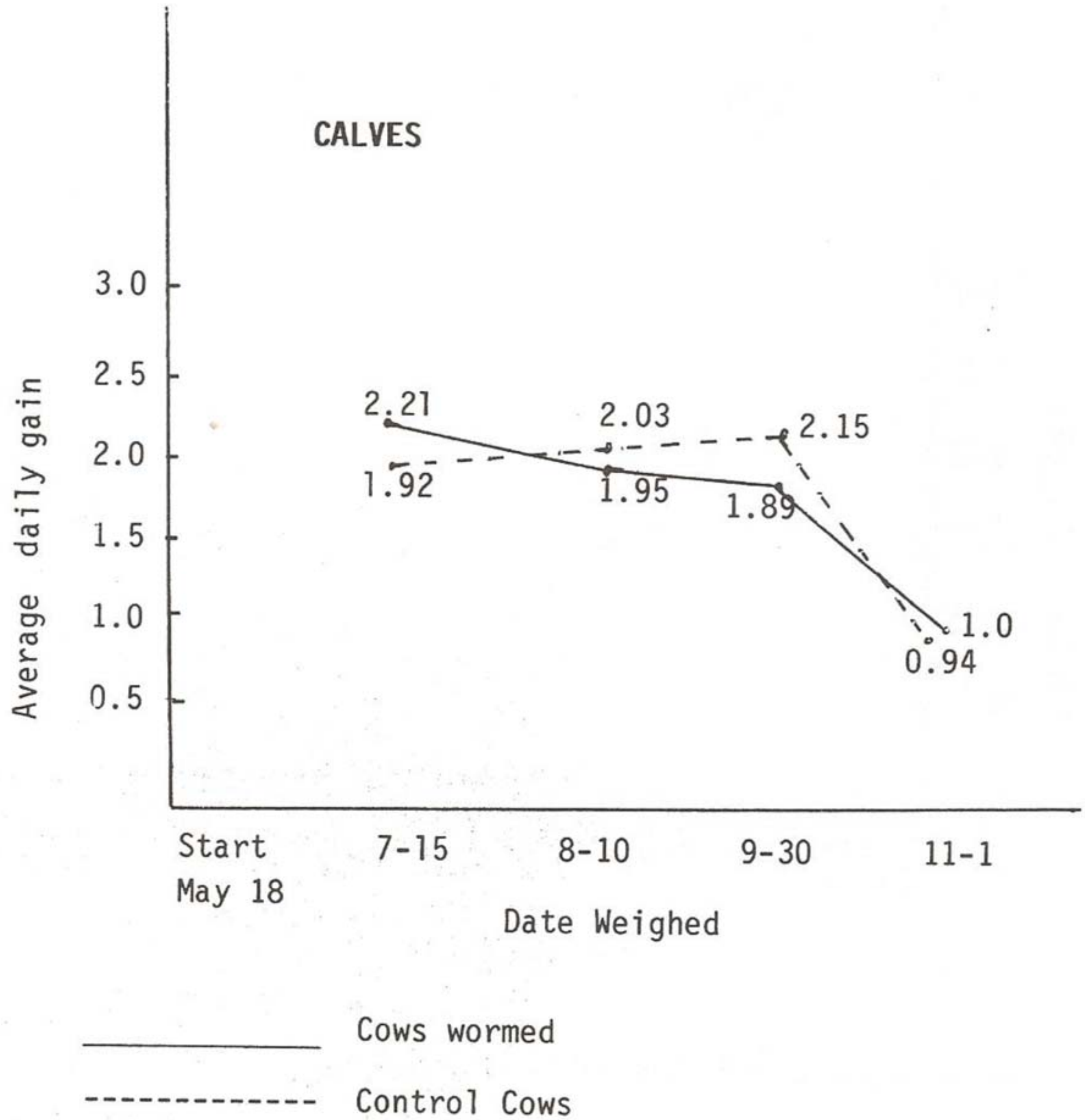
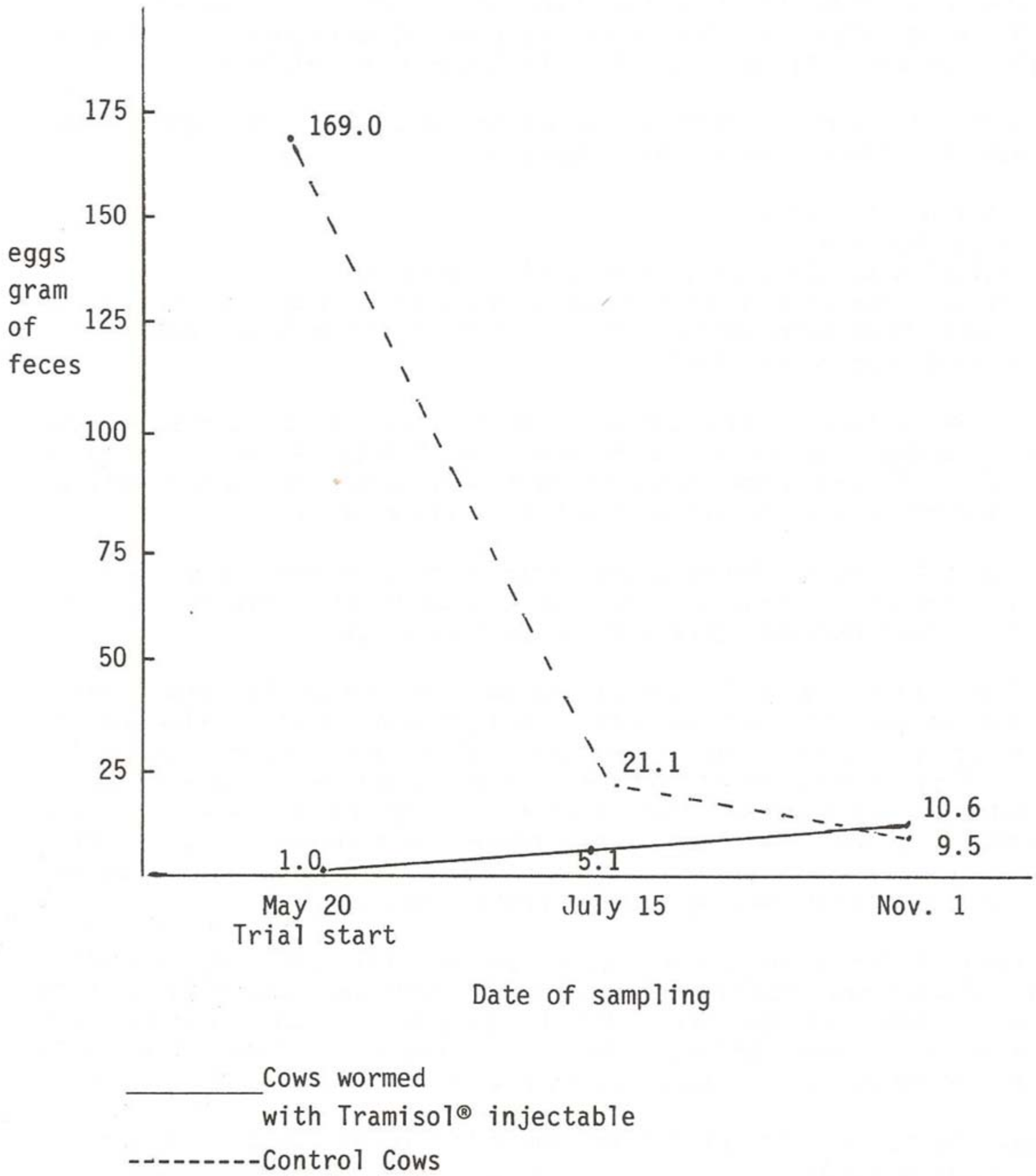


Figure 3: Fecal Egg Numbers Being Shed by Cows at Selected Dates after Worming with Tramisol®.



Evaluation of a Slow Release
Worming Bolus for Calves

By

D.G. Landblom and J.L. Nelson

In the spring of 1983 the Dickinson Experiment Station was approached by Pfizer Company Central Research Group to assist in evaluating a slow release worming bolus which they are planning to market. The compound being used in the slow release formulation is morantel tartarate, currently being sold under the trade name Rumatel®.

To evaluate the slow release anthelmentic bolus of this type it was determined that the following measurements would be needed:

1. Calf weight gains.
2. Fecal egg counts.
3. Actual nematode counts from sacrificed calves.
4. Actual nematode counts from sacrificed tracer calves introduced into experimental pastures three weeks before weaning.
5. Plasma pepsinogen levels.

To test the bolus, thirty cow/calf pairs with calves averaging 262 lbs. were randomly allotted to receive the Paratect® bolus or serve as controls. Straightbred Hereford cows were used that had Hereford, Angus X Hereford and Simmental X Hereford calves at side.

Before the trial began three calves from each treatment were selected to be sacrificed at weaning and their intestinal contents recovered so that actual nematode counts could be determined.

In addition, three dairy tracer calves were purchased for each treatment. The calves were wormed with Tramisol® and fecal sampled before being placed in the experimental pastures, to insure that no worm burden existed. Once determined to be worm free, they were placed in the trial pastures three weeks before the grazing aspect was completed on September 26th. These dairy bred calves were held in drylot three weeks after the grazing period was completed to allow worm development to advance sufficiently making identification easier.

During each 28 day weigh period, each cow and calf was fecal and blood sampled. Plasma pepsinogen levels in blood were analyzed by a private laboratory under contract with Pfizer Company. Fecal samples were analyzed by Dr. Myron Andrews, DVM, and laboratory technician, Mary Hansen of the Veterinary Diagnostic Laboratory at N.D.S.U.

Fecal egg counts by weigh period are shown in Figures 1 & 2, & production data is shown in Table 1.

Actual counts of worms recovered from sacrificed beef and dairy tracer calves are shown in Table 2.

Summary:

There were no significant differences in weight gains of calves, nematode egg counts, plasma pepsinogen levels, or actual nematode count at slaughter of three calves from each group. Three tracer calves allowed to graze in each pasture also showed no significant differences in worm burden at slaughter. Calf gains for the 91 day grazing period were 227 lbs. in both treatments.

Worm egg shedding was monitored throughout the study. At the beginning, cows in the control and treated groups were shedding 20.0 and 17.7 eggs per gram of feces (epg) respectively. By the end of the grazing period, due to the animal's natural resistance, cows in both groups were shedding approximately 4 epg. The calves, however, which have almost no resistance when young, increased egg shedding throughout the course of the grazing period. Eggs per gram shed by the calves ranged from 6.3 to 27.4 epg for the control and 3.0 to 25.1 epg for the treated calves when they were weaned.

Actual worm counts made on three sacrificed beef calves were 1,211 in the unmedicated control group and 2,793 in the calves carrying the slow release Paratect® bolus. Vacated boluses were recovered from each of the sacrificed calves, analyzed by a private laboratory, and were determined to have functioned properly.

Based on the results of this study no intestinal worm control was attained with the slow release Paratect® system.

Table 1. Weights and Gains for Cows and Calves in the Slow Release Worming Bolus Trial

	Control	Paratect®
No. Head	15	15
No. Days Grazing	91	91
Cows:		
Initial wt., lbs.	1127	1117
Final wt., lbs.	1247	1201
Gain, lbs.	120	84
ADG, lbs.	1.32	.92
Calves:		
Initial wt., lbs.	262	263
Final wt., lbs.	489	490
Gain, lbs.	227	227
ADG, lbs.	2.49	2.49

Table 2. Nematode Counts Taken From Intestinal Contents of Sacrificed Calves

	Control	Paratect®
Beef Calves	1211	2793
Dairy Tracer Calves	2795	5212

Figure 1: Summary of Fecal Egg Counts Obtained at Each Weight Period

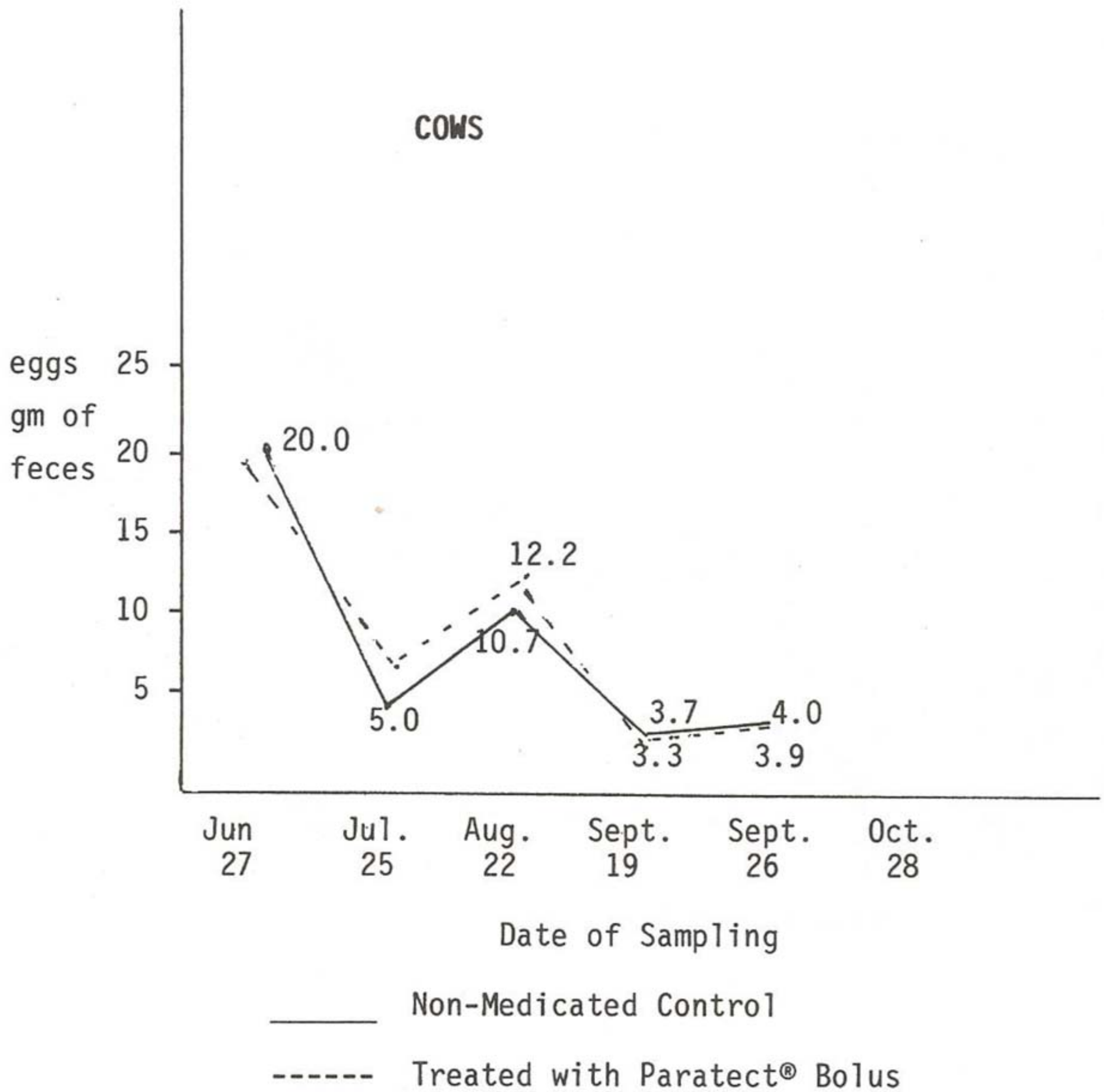
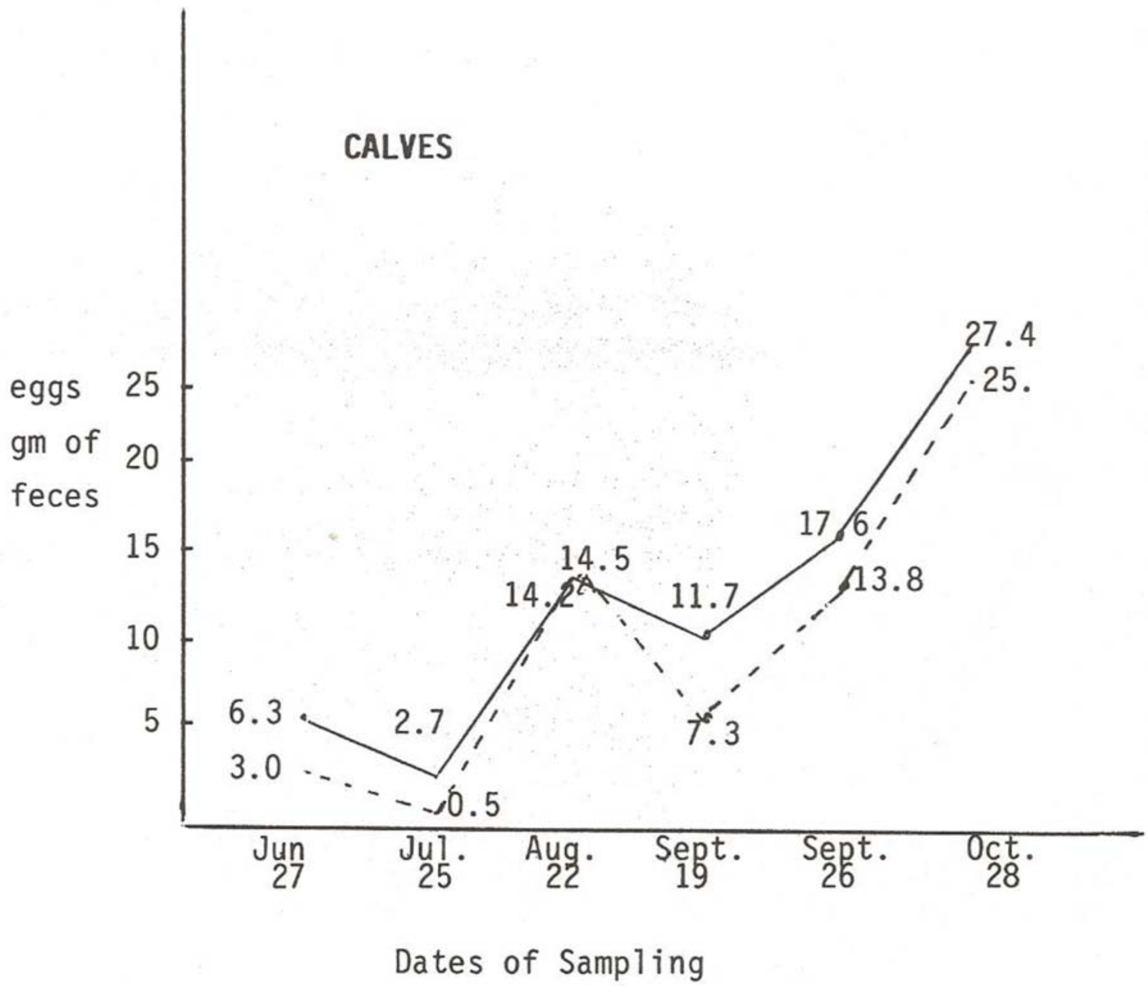


Figure 2: Summary of Fecal Egg Counts Obtained at Each Weight Period



Effects of Worming and Implanting Compared Among Backgrounded Steer Calves

By
J.L. Nelson and D.G. Landblom

Beef cattle producers are often faced with the decision of whether or not to deworm their livestock. In North Dakota, however, parasite research is very limited and those cattlemen who do use worming products do so based on very little local research. To date three worming experiments have been conducted at this station. One was a feedlot finishing study and two are pasture worming studies. Analysis of data in these studies has shown no advantage for deworming, except in therapeutic cases under the direction of a veterinarian, while adding unnecessary overhead costs to production. Under feedlot finishing conditions, it has been suggested that high energy rations cause the normal worm population to go into a sequescent state. Deworming during the backgrounding phase of production still remains to be investigated. It is possible that calves being grown on rations containing more roughage would be more likely to respond to worming.

Since worming has not been studied to any great extent in this geographical region, worm egg shedding during the winter and spring months from January to mid May needs to be monitored. Precise timing of worming isn't well defined and therefore, by monitoring fecal egg shedding, speciation and species fluctuation, baseline data will be obtained that will be useful in designing future research, with the objective of identifying the optimum time for worming.

Another objective of this study is to evaluate the ability of fenbendozole to kill arrested fourth stage larvae of <u>Ostertagia</u> <u>ostertagi.</u>

Numerous experiments throughout this country, and at this station, have shown the currently available growth promoting ear implants to be economically effective. No research has been conducted comparing the new fenbendozole wormer Safe-Guard® when used in combination with Compudose®.

To test the products being compared, straightbred Hereford and Angus X Hereford crossbred steer calves averaging 530 to 600 pounds respectively were randomly assigned by breed class to one of the following four treatments: Control, worm only with Safe-Guard®, implant only with Compudose®, and both wormed and implanted.

Those animals wormed with Safe-Guard® received 2.3 ml of drug suspension per 100 lbs. of body weight on January 19, 1984. On the average, each calf was given 12.5 to 13 ml of drug suspension using a "no waste" dosing gun.

Treatments receiving ear implants were given a single 24 mg estradiol implant which was deposited under the skin on the backside of the middle one-third of the ear.

The calves were weighed at 28 day intervals and fecal samples taken. Fecal samples were analyzed by Dr. Myron Andrews, DVM and his technician, Mary Hansen, at the Veterinary Diagnostic Laboratory, N.D.S.U.

The ration fed was very simple consisting of 42.15% chopped hay, 55% barley, .5% dicalcium phosphate and 2% trace mineral salt.

Summary:

Worming backgrounded Hereford and Angus X Hereford steers in a 119 day growth study did not result in faster and more efficient gains. Using the worming product Safe-Guard® reduced worm egg shedding and cultured larvae to zero during the first half of the study. Shedding and numbers cultured began to increase during the last half of the study indicating that the arrested 4th stage larvae of Ostertagia ostertagi was not affected by the drug fenbendozole. Culturing revealed five species of worms: Brown stomach worm (Ostertagia ostertagi), small stomach worms (Cooperia punctata and C. oncophora), small stomach worm (Trichostrongylus axei), and the threadnecked intestinal worm (Nematoderies). Of these five species only the two species of small stomach worms and the brown stomach worm appeared in any numbers.

Implanting had the greatest impact on daily gains and feed efficiency. Hereford and Angus X Hereford steers implanted and wormed posted the highest daily gains and greatest improvement in feed efficiency. When compared to the steers that were wormed only, it appears that the improvement in performance strongly favors the effects of implanting and not worming. Analysis of the data presented here shows that worm burdens present in these test steers were not great enough to have had a detrimental effect on growth performance.

Worming and implanting among both the Hereford and Angus X Hereford steers resulted in a net return of $15.94 more per head for the Herefords and $11.77 more per head for the crossbreds when compared to the control steers.

Figure 1: Summary of Average Number of Worm Larvae Cultured from Combined Lots (For Compudose Implant)

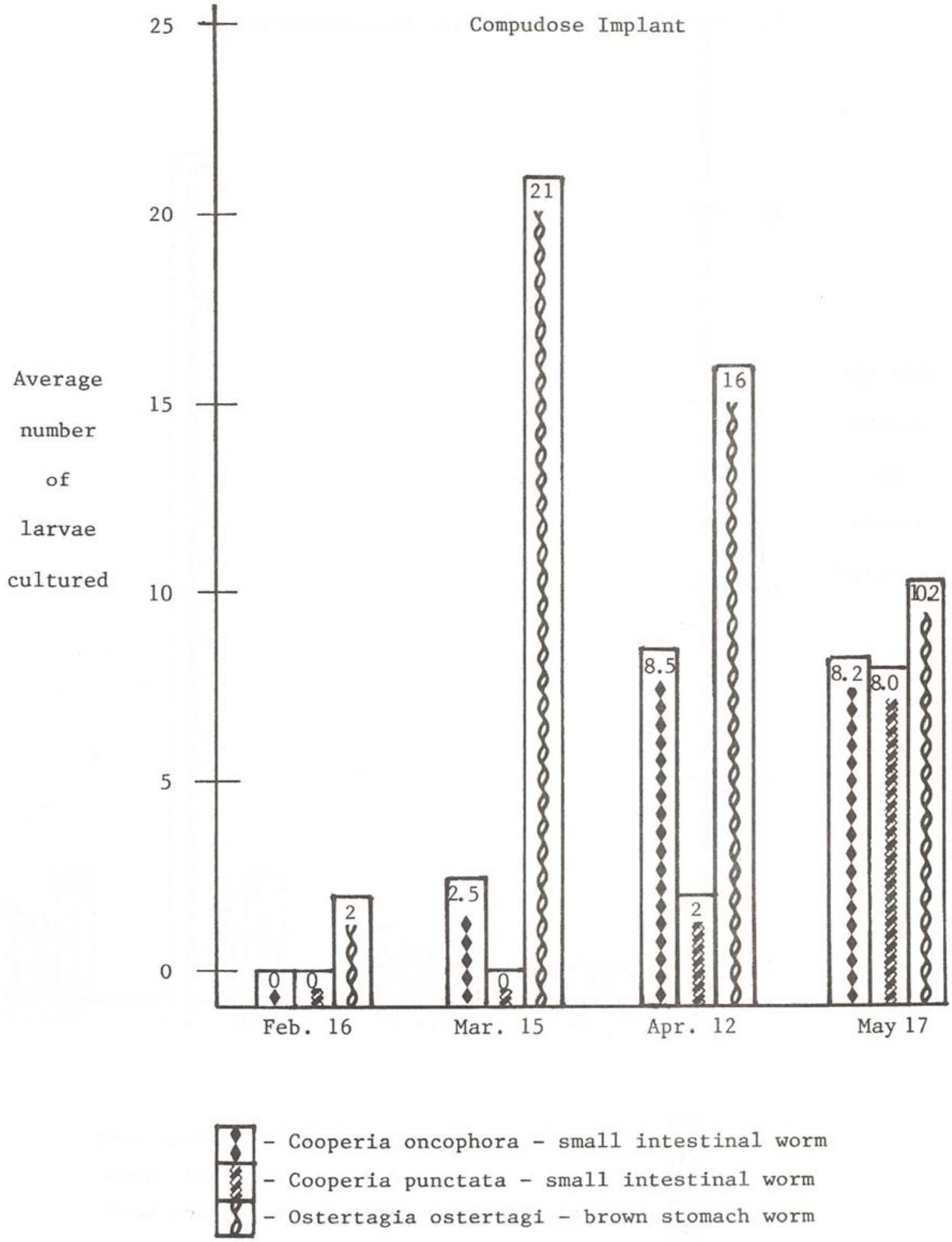


Figure 2: Summary of Average Number of Worm Larvae Cultured from Combined Lots. (For Safe-Guard / Compudose)

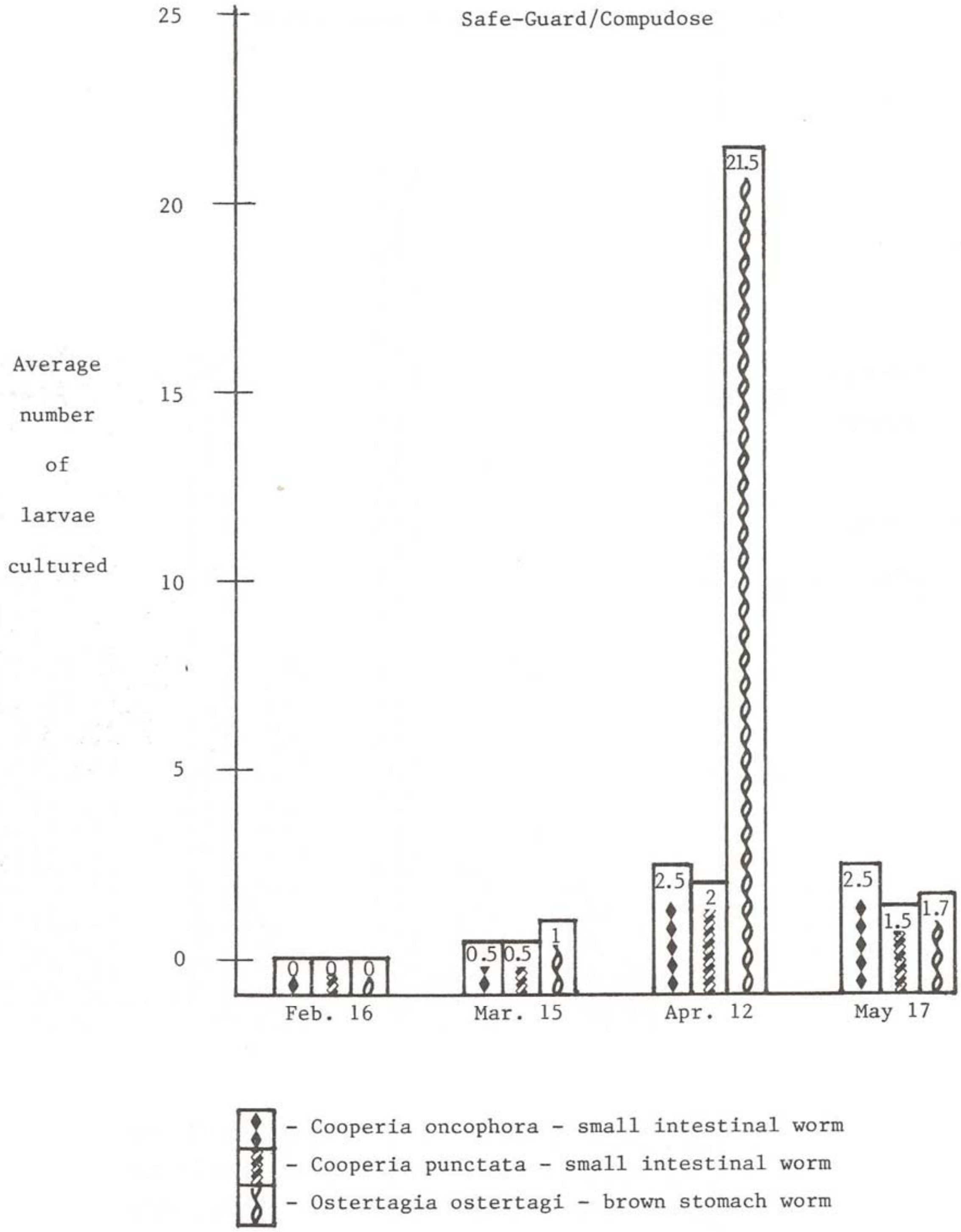


Figure 3: Summary of Average Number of Worm Larvae Cultured from Combined Lots (For Control)

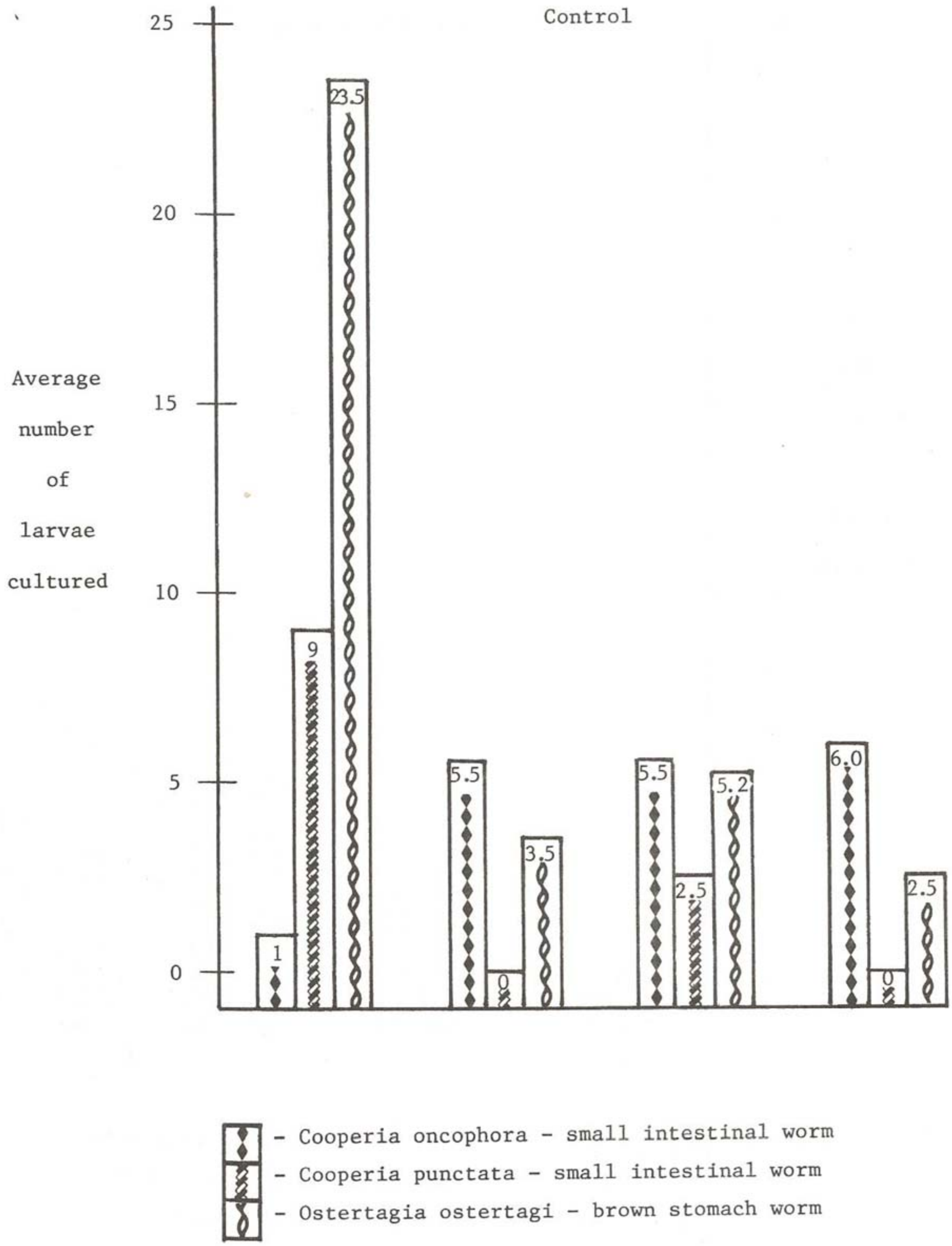


Figure 4: Summary of Average Number of Worm Larvae Cultured from Combine Lots (For Wormed with Safe-Guard®)

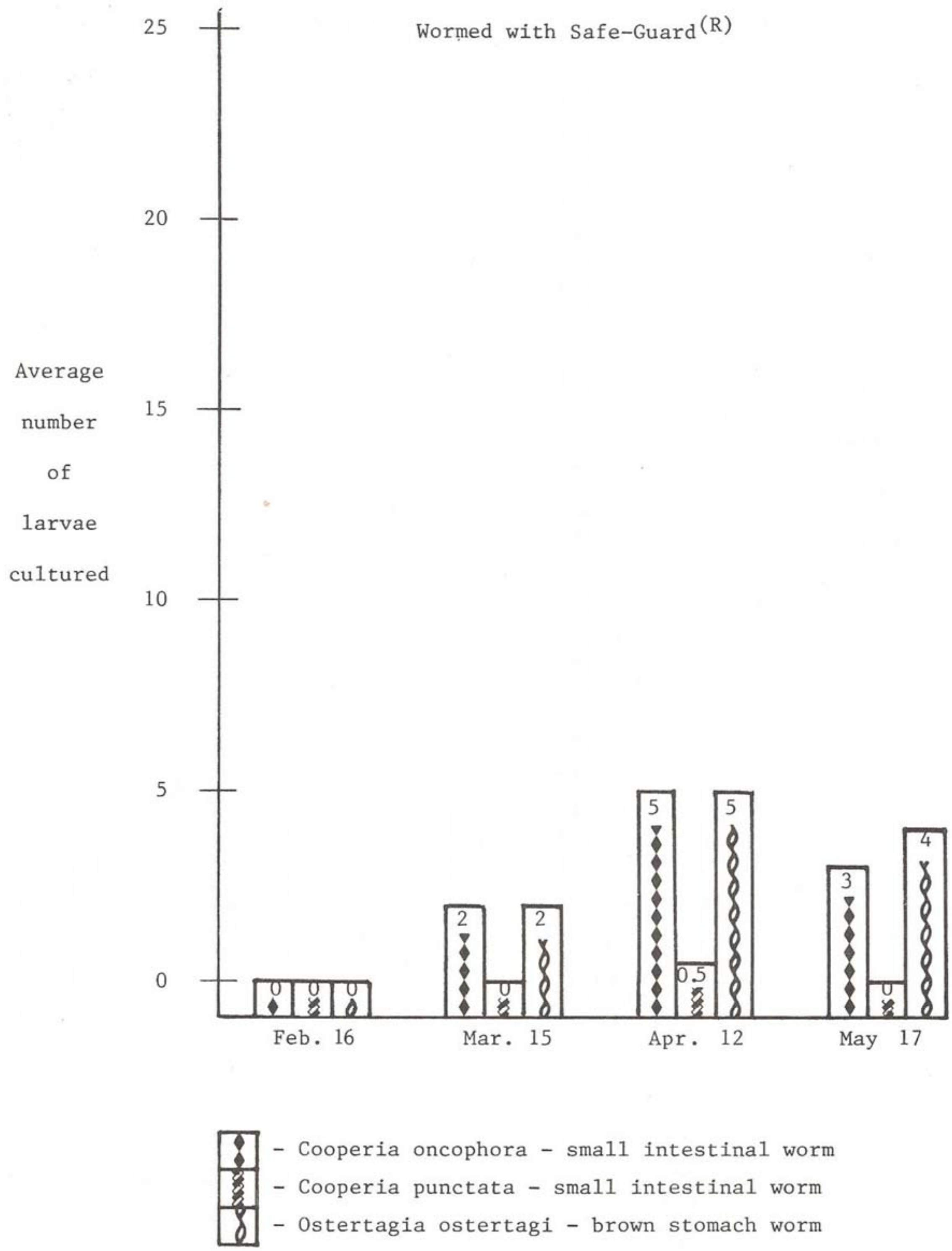


Table 1. Summary of Angus X Hereford Steers Backgrounded to Compare Worming with Safe-Guard®, Implanting with Compudose®, and the Two Products Combined

Angus X Hereford Steers	Control	Safe Guard®	Compudose®	Safe-Guard® Compudose®
No. Head	6	6	6	5 1/
Days Fed	119	119	119	119
Initial Wt., lbs.	606	603	599	592
Final Wt., lbs.	874	886	893	913
Gain, lbs.	268	283	294	321
A.D.G., lbs.	2.25	2.38	2.47	2.69
Feed/Day, lbs.	20.7	23.2	23.9	22.2
Feed/lb. gain, lbs.	9.2	9.75	9.68	8.26
% Improvement	0	+5.9%	+5.2%	-10.2%
Feed Cost/Cwt. gain, $	37.12	39.35	39.06	33.33
Avg. Selling Price/Cwt., $	57.97	57.97	57.97	57.97
Avg. Value Head, $	506.65	513.61	517.67	529.26
Feed Cost/Steer, $	99.39	111.49	114.79	106.83
Implant Cost/Steer, $	----	----	2.10	2.10
Worming Cost/Steer, $	----	1.30	----	1.30
Return Over Expenses, $	407.26	400.82	400.78	419.03
Difference Compared to Controls, $		-6.44	-6.48	+11.77

1/ One steer died of heart failure.

Table 2. Summary of Hereford Steers Backgrounded to Compare Worming with Safe-Guard®, Implanting with Compudose®, and the Two Products Combined

Hereford Steers	Control	Safe-Guard®	Compudose®	Safe-Guard® Compudose®
No. Head	6	6	6	6
Days Fed	119	119	119	119
Initial Wt., lbs.	544	532	523	541
Final Wt., lbs.	817	796	848	868
Gain, lbs.	273	264	325	327
A.D.G., lbs.	2.29	2.21	2.73	2.75
Feed/Day, lbs.	18.9	18.2	21.0	21.0
Feed/lb. gain, lbs.	8.23	8.26	7.69	7.63
% Improvement	0	0	-6.6%	-7.3%
Feed Cost/Cwt. gain, $	33.21	33.32	31.03	30.79
Avg. Selling Price/Cwt. $	57.97	57.97	57.97	57.97
Avg. Value/Head, $	473.61	461.44	491.58	503.17
Feed Cost/Steer, $	90.58	87.65	100.94	100.80
Implant Cost/Steer, $	----	----	2.10	2.10
Worming Cost/Steer, $	----	1.30	----	1.30
Return Over Expenses, $	383.00	372.49	388.54	398.97
Difference Compared to Controls, $		-10.54	+5.51	+15.94

Using Rumensin® in Rations For Wintering Replacement Heifer Calves

D. G. Landblom and J.L. Nelson

Developing a heifer calf to become a producing unit is an expensive venture. The largest portion of the expense is incurred for feed and maintenance. Since feed makes up a large portion of the expense of raising a replacement heifer, anything that will reduce the cost of feed without affecting growth or reproductive performance needs to be included in the overall management system.

The feed additive Rumensin® (monensin sodium), has been shown to be effective in reducing feed intake by 6-10% without affecting gains under feedlot conditions. Steer feeding trials conducted at this Station and reported in the 28th, 29th and 33rd Annual Livestock Research Roundup Bulletins show a strong advantage in feed savings and feed cost when Rumensin® was fed for maximum gains at levels of from 150-300 mg. per head per day. In addition, numerous research reports from University testing across this country and industry acceptance have shown both a savings of feed and cost advantage when Rumensin® was fed. One area that hasn't been as widely studied is the use of Rumensin® in classes of cattle, such as replacement heifers, which aren't being fed necessarily for maximum gains. There is some research that shows an advantage for earlier conception rate and earlier calving resulting in more time for the first calf heifer to return to regular cyclicity after calving with her first calf.

This investigation, which began with replacement type Angus and Hereford heifer calves in December 1981, has been conducted for 3 consecutive wintering periods: 1982, 1983, and 1984. Data collected to date also includes two calving periods with the last calving period in the spring of 1985 to complete data collection for this investigation.

Replacement type Angus X Hereford crossbred heifers weighing 500 lbs. were allotted to one of four experimental lots. Two lots received 150-250 mg. Rumensin® per day and two lots served as controls. Rumensin® was adjusted in the ration as daily feed consumption changed throughout the study. GTA's Beef Mix 600® was used as the supplement.

Just before the start of the experiment all heifers were booster vaccinated with a 7-way Clostridium Vaccine and wormed with Rumatel®.

Rations fed were complete mixed formulations that were adjusted in accordance with weight gains desired and winter conditions.

Onset of puberty was identified by placing sterile epididectomized yearling marker bulls in each lot. Heifers marked were recorded daily. In June of each year the heifers were randomly divided and used in an estrus synchronization study reported elsewhere in this progress report.

Summary:

Results of this investigation to date have not shown the strong advantage for Rumensin® when fed to replacement heifers that has been shown in other studies with heifers and with steers fed for maximum gains.

There was really no difference in daily gain, which was as expected because feed energy level was controlled to obtain a particular growth rate. Doing so resulted in a 4.2% improvement in feed efficiency in favor of the Rumensin® fed heifers. While there was an improvement in feed efficiency, the improvement was not great enough to offset the added ration expense.

Onset of puberty was slightly earlier among the Rumensin® fed heifers but the improvement was not a significant one. Analysis of calving data clearly shows no difference in the number of heifers conceiving by artificial insemination and the number of open females following a short 45-50 day breeding season.

Two year average calving date differed by only 2 days and favored the Rumensin® fed heifers.

Based on these data, and under conditions where gains are limited by energy level, including Rumensin® is of limited value. Two attributes of Rumensin® that must not be overlooked, however, are its value as a coccidiostat and bloat preventative.

Table 1. Calving Summary of 1st Calf Heifers Wintered Following Weaning as Calves With or Without Rumensin®

	Rumensin®		**Control**	
	1982	**1983**	**1982**	**1983**
No. Head	34	24	34	24
No. having calves	27	21	28	21
No. open in fall-sold	7	3	5	3
No. AI sired calves	20	15	20	16
No. Nat. sired calves	7	6	8	5
Average calf birth wt.	77.4	88.3	83.4	85.6
Average birth date	Mar. 18	Mar. 29	Mar. 24	Mar. 26
Combined average birth weight	82.8		84.5	
Combined average birth date	Mar. 24 1/		Mar. 26 1/	

1/ Rounded to nearest day.

Table 2. Time of First Estrus among Replacement Heifers Wintered With and Without Rumensin®

	Rumensin®		Control	
Time of Detection	**No. Head**	**%**	**No. Head**	**%**
February	6	7.7	1	1.2
March	29	37.2	30	38.5
April	31	39.7	36	46.2
May	8	10.3	5	6.4
Undetected	4	5.1	6	7.7
Total	78		78	

Table 3. Three Year Average Gains and Feeding Economics for Angus X Hereford Crossbred Replacement Heifers Wintered With and Without Rumensin® Feed Additive

	Rumensin®	Control
Gains:		
No. Head	78 1/	78 1/
Initial Wt., lbs.	549.9	550.6
Final Wt., lbs.	785	781.8
Avg. Days Fed	117.0	117.0
Gain/Head, lbs.	235.1	231.2
ADG, lbs.	2.00	1.97
Feed & Economics:		
Total Feed/Head, lbs.	2337.6	2385.8
Feed/Head/Day, lbs.	19.90	20.25
Feed/Lbs. Gain, lbs.	9.88	10.31
Total Cost/Head, $	106.96	104.03
Cost/Day, $	.9105	.8829
Cost/Cwt. Gain, $	45.49	44.99

1/ Detector bulls placed in each lot, but feed and gains not confounded in this data.

Feedlot Breed Comparison of First Generation Steers: Hereford, Angus X Hereford, Milking Shorthorn X Angus X Hereford, and Simmental X Hereford

By

D.G. Landblom, J.L. Nelson and P. Berg

A very large percentage of beef cattle producers in this country are switching to more crossbreeding in an attempt to show a profit in their beef cattle enterprise. Which crossbred type to use is not a very easy decision to make, and is generally made based on what type and breed combination is selling well at the time. Since the generation interval in cattle is long and the margin between profit and loss is often small, producers are often trapped into producing a terminal cross calf instead of developing a high producing brood cow first.

Research comparing efficiencies of cows is just beginning to filter out of research facilities in this country and Canada. In keeping with current research needs, an investigation to evaluate biologically different breed types in a cow efficiency study is underway at this station to give stockmen an opportunity to use data that has been collected closer to home.

In this breeding model, crossbred brood cow types that are biologically diverse are being developed that will maximize heterosis when outcrossed to unrelated terminal Sire breeds. Brood cow development for the efficiency study results in the production of steer calf counterparts. This phase of the investigation is designed to evaluate feedlot performance and carcass results from steers produced during the first generation of breeding. Generation one breeding is shown in Table 1.

Steers used represented each breed combination and were started on feed when average weights ranged between 600 and 675 pounds. Seven steers were allotted to each treatment, implanted with Compudose®, treated for lice with Lysoff® and booster vaccinated with a 7-way Clostridum vaccine.

The steers were bunkline fed a complete mixed ration that began at 30% barley and increased to 75% barley, in regular 5% increases, where they remained for the duration of the study.

The steers were fed on a grade constant basis meaning that each group was fed until it was felt that 60% of the animals would meet a choice grade goal.

Slaughter was done at Held Beef, West Fargo, North Dakota, and carcass evaluation was done by Dr. Paul Berg, NDSU Animal Science Department.

Feeding gains, economics and carcass data and returns over feed are shown in Table 2.

Summary:

The steers in this feeding study were fed on a grade constant basis. Our goal was 60% choice, but we were unable to attain that goal with any of the breed groups. Since each group was fed to a grade constant basis, the groups of steers were sent to slaughter at Held Beef in West Fargo when it was felt that the group was ready. The Angus X Hereford (AxH) and Milking Shorthorn X Angus X Hereford steers were sent to slaughter together on July 17th. The Hereford (H) and Simmental X Hereford (SxH) steers were not ready and remained on feed. Although they still didn't appear to be ready visually after an additional 21 days on feed, they began backing off on feed and had to be slaughtered short of our goal.

The (AxH) steers demonstrated the most successful performance through feeding and marketing of their carcasses. Daily gains for each of the groups were 2.41, 2.69, 2.88, and 2.45 pounds per day for the (H), (AxH), (MSxAxH) and (SxH) steers respectively.

Carcass quality based on USDA quality grade varied substantially. The percentage of steers reaching the choice grade in each group were 29%, 29%, 43% and 57% for the (H), (SxH), and (AxH) and (MSxAxH) respectively.

Feed efficiency as reflected by the cost per hundredweight of gain ranged from a high of $41.70 among the (SxH) steers to a low of $35.72 for the (H) steers. Feed costs for the other breed groups fell between these two extremes. Cost per hundredweight of gain for the (AxH) steers was $35.88, and the (MSxAxH) group cost $37.04/cwt to feed.

The infusion of Angus and Milking Shorthorn breeding improved carcass quality and overall net returns for the (AxH) and (MSxAxH) breed groups. Angus X Hereford steers returned the most dollars over feed cost at $452.52 and were followed closely by the (MSxAxH) group at $440.57.

Feeding of generation one steers will be continued two more years.

Table 1. Generation I Breeding Scheme

Foundation Cows	X	Sire Breed	Generation I Progeny
Hereford	X	Hereford Angus Simmental	Hereford Angus X Hereford Simmental X Hereford
Angus X Hereford	X	Milking Shorthorn	Milking Shorthorn X Angus X Hereford

Table 2. Feedlot Gains, Economics and Carcass Data for First Generation Steers

	Hereford	Angus X Hereford	M. Shorthorn Angus X Hereford	Simmental X Hereford
Gains:				
No. Head	7	7	7	7
Days Fed	195	174	174	195
Initial Wt., lbs.	598.4	644	646.2	675.4
Final Wt., lbs.	1069.3	1112.1	1148.6	1153.6
Gain, lbs.	470.9	468.1	502.4	478.2
ADG, lbs.	2.41	2.69	2.88	2.45
Economics:				
Feed/Head, lbs.	3987.7	3985.4	4411.3	4729.7
Feed/Head Daily, lbs.	20.45	22.90	25.35	24.25
Feed/Lb. of Gain, lbs.	8.48	8.51	8.08	9.90
Feed Cost/Head, $	168.20	167.97	186.07	199.41
Cost/Cwt. of Gain, $	35.72	35.88	37.04	41.70
Carcass Data:				
USDA – Grade	2 Choice 5 Good 2/	3 Choice 4 Good 1/	4 Choice 3 Good 1/	2 Choice 5 Good 2/
Hot Weight, lbs.	613.4	651	648.9	663.4
Carcass Value, $	562.62	620.49	626.64	608.92
Return Over Feed, $	394.42	452.52	440.57	409.51

1/ Choice Carcass Value $101.00/cwt; Good Carcass $91.00/cwt.
2/ Choice Carcass Value $ 96.00/cwt; Good Carcass $90.00/cwt.

Winter Growth and Breed Production
Comparison of First Generation Heifers

By

D.G. Landblom and J.L. Nelson

One of the major segments of the Dickinson Experiment Station's beef cow efficiency study is to evaluate the winter growth and production efficiency of each experimental breed. This overall study has been undertaken to provide cattlemen with information relative to beef cow efficiency that's been conducted in Southwestern North Dakota. This station doesn't have the land base or animals to evaluate a large number of biologically different breeds, but does have the capability of evaluating a small number of crossbred cow types that will be representative in performance to many of the combinations possible in North America.

As stated in the previous discussion, "Feedlot Breed Comparison of First Generation Steers", the breeding model presented here is designed to develop crossbred brood cow types that are biologically diverse which will maximize heterosis when outcrossed to unrelated terminal sire breeds. The first generation breeding scheme is shown in Table 1.

Winter growth performance, age and weight at puberty, first service conception rate and weaning weight of calves from these calves as first calf heifers are being evaluated in this phase of the overall cow efficiency investigation.

For the purpose of this progress report, information available includes winter growth performance and age and weight at puberty.

Replacement heifer calves representative of each breed type were randomly selected at the conclusion of a weaning management study and fed during the wintering period. Rations used were self-fed and consisted of barley, ground mixed hay (crested wheatgrass, brome grass, and alfalfa in approximately equal proportions), salt, and dicalcium phosphate. Barley was started in the ration 30% and increased to 55% where it was held for the duration of the study.

The calves were booster vaccinated three weeks before weaning with a 7-way Clostridium vaccine, and were also vaccinated for brucellosis.

As a preventive measure, the heifers were vaccinated for leptospirosis and vibriosis one month before the start of the breeding season.

The heifers were weighed at 28 day intervals until sterile epididectomized bulls were placed with them. Once the heifers started cycling they were weighed at 14 day intervals and weight at puberty computed.

Starting June 1, the heifers were randomly inseminated with Angus semen for their first calf.

Summary:

Completion of this first wintering period has resulted in some very distinct differences between the heifer breed types being compared.

Simmental X Hereford (SxH) heifers were heaviest (789.6 lbs.) and required the most days of age (383.4) to reach puberty. When reviewing Table 2, you will see that the (SxH) group had the widest onset of puberty distribution. Dates of onset were scattered throughout the months of March, April, May and June, whereas the other breed types were scattered within the months of February, March and April. Those heifers of other breed groups, namely Hereford (H), Angus X Hereford (AxH) and Milking Shorthorn X Angus X Hereford (MSxAxH) that were more tightly grouped had substantially more heat cycles before breeding started on June 1st than did the (SxH) group. Infusion of dairy blood from the Milking Shorthorn breed shortened the average number of days required to reach puberty to 350 days, making them the earliest cycling group. Their weight at puberty was 704.8 pounds. There was no difference in the number of days required for the (H) and (AxH) groups to reach puberty. They required 355 and 354 days respectively. Their weight at puberty was 685.7 pounds for the (AxH)'s and 673.8 pounds for the (H) heifers, a difference of 11.9 pounds.

Daily gains during the wintering period ranged from 2.43 pounds per day among the (SxH) and (H) groups to 2.34 pounds per day among the (MSxAxH) and 2.16 pounds per day among the (AxH) group.

Efficiency of gain as reflected in the wintering cost per hundred pounds of gain varied between groups. Hereford heifers wintered most economically, costing $32.23/cwt. of gain and were followed closely by the (SxH) group costing $33.76/cwt. Wintering costs for the (AxH) heifers were $1.70 higher costing $35.46/cwt. The Milking Shorthorn cross heifers had the highest wintering costs of $38.33.

The values reported here will no doubt change as more data is accumulated in future years. Final conclusions should be reserved until the study is completed.

Table 1. First Generation Breeding Scheme

Foundation Cows	X	Sire Breed	Generation I Progeny
Hereford	X	Hereford	Hereford
	X	Angus	Angus X Hereford
	X	Simmental	Simmental X Hereford
Angus X Hereford	X	Milking Shorthorn	Milking Shorthorn X Angus X Hereford

Table 2. Puberty Summary: Distribution of Heat Cycles, Age, Weight and Average Date Puberty Was Reached

	Hereford	Angus X Hereford	M. Shorthorn Angus X Hereford	Simmental X Hereford
Distribution:				
No. Head	9	20	10	10
February	----	5%	30%	20%
March	67%	80%	70%	30%
April	11%	15%	----	20%
May	11%	----	----	10%
June	----	----	----	20%
Not Detected 1	11%	----	----	----
Puberty Statistics:				
Average Cycle Date,				
Numerical	90	76.5	63.2	98.7
Calendar	March 30	March 18	March 04	April 08
Age at Puberty,				
Days	355	354	350	383.4
Months	11.8	11.8	11.6	12.8
Average Wt. at Puberty	673.8	704.8	685.7	789.6

1/ Heifers in this category had not been detected by the time artificial breeding was completed.

Table 3. Gains and Wintering Economics for First Group of Heifers To be used in the Cow Efficiency Study

	Hereford	Angus X Hereford	Shorthorn Angus X Hereford	Simmental X Hereford
Gains:				
No. Head	9 1/	20 2/	1	10
Days Fed	101	101	101	101
Initial Wt. lbs.	498	567	586	621
Final Wt. lbs.	744	785	822	866
Gain, lbs.	246	218	236	245
ADG, lbs.	2.43	2.16	2.34	2.43
Feed & Economics:				
Total feed/head, lbs.	1991	1949	2285	2086
Feed/head daily, lbs.	19.71	19.30	22.62	20.66
Feed/lb. gain, lbs.	8.11	8.93	9.66	8.50
Feed cost/day, $	.7834	.7654	.8975	.8190
Total feed cost, $	79.13	77.31	90.65	82.71
Cost/Cut gain, $	32.23	35.46	38.33	33.76

1/ One heifer died – heart failure

2/ Replicated lots of 10 head each were used in the Rumensin® study. These two lots were used as control lots in that study and served as the Angus X Hereford breed group in this breed comparison.

Estrumate®, Lutalyse®, and Synchromate-B® Compared For Synchronizing Heat Cycles in Beef Heifers

By
D.G. Landblom and J.L. Nelson

It has been the goal of cattlemen to be able to have all heifers cycling at the start of the breeding season, complete breeding in a very short time, use superior high indexing sires and obtain a high conception rate on the first service without the labor of heat detection when breeding artificially.

Scientists and the advancing technology of reproduction now have three compounds available for commercial use to synchronize reproductive cycles in beef heifers. The first compound, Estrumate® manufactured by a British company, Havre-Lockhart, is distributed in this country by Bayvet Division of Cutter Laboratories, Inc. Estrumate® is the registered trade name for cloprosteral sodium, a synthetic analog of prostaglandin F-2 Alpha. Lutalyse® is Upjohn Company's trade name for the prostaglandin F-2 substance that occurs naturally in animal systems. Prostaglandins in the animal system do more than one thing, but they are most known for their ability to cause the corpus luteum that forms in the ovarian follicle to regress resulting in a return to heat in 2 to 5 days after it is given. Synchromate-B®, on the other hand, has a completely different mode of action than the prostaglandins and is manufactured by CEVA laboratories. It is a progestin/estrogen combination that keeps cattle from coming into heat for nine days, and when it is removed heat cycles are tightly grouped.

Previous research at this Station with the 25 mg prostaglandin compound, Lutalyse® has shown that a single 25 mg injection system is most economical and that highest conception rates are obtained when inseminations are done according to estrus instead of on a timed basis. Also, in a comparative study using reduced rates, Dr. Gary Williams, NDSU, Reproductive Physiologist, found that synchronization results were the same when the dosage per heifer was reduced from 25 mg to 15 mg. This reduction reduced the cost of synchronization substantially.

Synchromate-B® was released for use in beef and dairy heifers in the spring of 1983. One of the advantages for Synchromate-B® is that it produces a very tight synchronization and was clearly shown to be a compound formulation that would truly allow cattlemen to artificially inseminate cattle without detecting heat.

Comparing these products, while using reduced dosages of Lutalyse®, under field conditions is the purpose of this investigation. The different parameters measured include: the result when reduced dosages of Lutalyse® are used, ease of use, number of days labor required for heat detection and handling, labor requirements needed for placement and removal of ear implants, conception rate and overall economics of each method.

Comparison of these compounds was done using Hereford and Angus X Hereford replacement heifers wintered at the Dickinson Experiment Station. Onset of puberty was recorded for all heifers using epididectomized marker bulls during the wintering period in drylot. The heifers were randomly allotted to the three treatments by age, weight, breed, and number of heat cycles each had before the start of the breeding season.

Heifers in the Estrumate® and Lutalyse® groups were detected for heat during the five day conventional pre-synchronization breeding period. On the morning of the 6th day all heifers not inseminated during the 5 day period were given either 2 cc Estrumate® or 3 cc Lutalyse® intramuscularly using a 1" X 16 gauge needle. After these two compounds were given the heifers were inseminated 12-14 hours after being detected in standing heat. Sterile marker bulls were used to simplify heat detection.

On the day that detection and breeding began in the Estrumate® and Lutalyse® groups, heifers in the Synchromate-B® treatment were implanted. The Synchromate-B® system consists of an ear implant impregnated with a potent progestin compound, norgestamet, and a 2 ml injection containing a solution of norgestamet and an estrogen, estradiol valerate. Implants and injections were made with strict adherence to the manufacturer's instructions. Asepsis is very important and therefore, the ear was clipped with an animal clipper, scrubbed with a detergent and nolvasan solution and further disinfected with alcohol before the implant was placed on the backside of the middle one-third of the ear. The implant remained in place for nine days and was removed the same time of day that it was installed. Removal was done by breaking through the scab and scar tissue with a forceps. Using the forceps to grasp and a thumbnail to apply pressure on the implant, it was slid back through the hole of entry.

The implanter needle was immersed in alcohol between implantings. The 2 cc injection of norgestamet and estradiol valerate were given using a 1½" X 16 gauge needle and 2 cc hypodermic syringes.

The heifers were inseminated once and then placed with Milking Shorthorn and Polled Hereford clean-up bulls for a total breeding period of 50 days.

SUMMARY:

Success in terms of conception rate didn't differ substantially. The highest conception percentage was obtained with Lutalyse® using a reduced dosage of 15 mg/hd. Conception rates were 47.8%, 56.5% and 52.2% for Estrumate®, Lutalyse® and Synchromate-B®. Although the chemistry of Lutalyse® and Estrumate® are quite different, they performed in much the same manner. The major difference was that conception rate in the Estrumate® group was 8.7% lower.

The most dramatic difference in this field study was the cost of synchronization drug per heifer conceiving. Synchromate-B® required no heat detection and two handlings. Neither method was particularly difficult. The most economical method was Lutalyse® at the 15 mg level per head, costing \$3.92 per heifer conceiving. By contrast, the Synchromate-B® system cost \$17.72 per heifer conceiving. Estrumate® was slightly higher than Lutalyse® at \$6.56 per heifer conceiving.

Table 1. Estrumate®, Lutalyse®, and Synchromate-B® Compared For Estrus Synchronization in Beef Heifers

	Estrumate®	Lutalyse®	Synchromate-B®
No. Head/Treatment	23	23	23
No. Head inseminated during 5 day pre-synchronization breeding period	6	6	----
No. Head given synchronization drug	17	17	23
No. Head not detected in heat and not inseminated	4	3	--1/
No. Head having AI sired calves	11	13	12
No. Head having calves sired by clean-up bull	9	5	9
No. of open heifers	3	5	2
Conception Rate, %	47.8%	56.5%	52.2%
Amount of Drug Used/Head	**500 mg/2 cc**	**15 mg/3 cc**	**Implant and 2 cc Injection**
Cost/Heifer treated, \$	4.25	3.00	9.25
Total Cost/Lot, \$	72.25	51.00	212.75
Cost/Heifer conceiving to synchronized estrus, \$ 2/	6.56	3.92	17.72

1/ All heifers in this treatment were inseminated by appointment at 50 hours after implant removal.

2/ Value is for synchronization only; semen costs were \$10/straw.

Vaccination of Pregnant Heifers with an E. Coli Bacterin Vicogen® to Reduce the Incidence and Severity of Calf Scours

By

D.G. Landblom and J.L. Nelson

It is often said that an ounce of prevention is worth a pound of cure. If this is true, then a program of prevention by vaccination rather than treatment by medication would be desirable. Colostrum from heifers is normally lower in antibody level than colostrum from older cows. Also, heifers tend to produce less milk and are usually poorer mothers than mature cows. Therefore, a pre-calving vaccination program to increase specific immunities in the heifer would seem to be a valid management decision. Recent research at Kansas State University 4/ indicates that poor energy input for heifers prior to calving may lower antibody count and in the process, affect the colostrum protection for the calf.

Currently, there appears to be some difference of opinion between U.S. and Canadian workers as to the value of vaccination as a preventive for calf scours.

Work reported by Schipper and Landblom 3/ indicated that vaccination of cows with E. Coli bacterins had no demonstrable preventive activity to clinical enteritis in the neonatal calf. Vaccines used in this trial were K99, and the Coligen vaccine.

In other studies by Dr. Schipper, (personal communication) conducted during two calving seasons, 14.6% of Vicogen® and 12.3% of Coligen vaccinated heifers had calves that demonstrated clinical enteritis. Only 5.4% of the control calves (heifers not vaccinated) developed clinical enteritis.

Canadian researchers Makarechian and Acres 1,2/ reported positive results in reducing the incidence of calf scours by vaccinating the heifers with the Vicogen® brand of E. Coli vaccine. In their work, vaccination of heifers with Vicogen® at 7 and 3 weeks prior to start of calving reduced the incidence of calf scours considerably. They concluded that every dollar invested in Vicogen® vaccination returned $5.96 at weaning. They also concluded that had the entire herd been vaccinated it would have increased returns by 12.2% at weaning.

The purpose of this investigation is to evaluate the effectiveness of the E. Coli bacterin, Vicogen® to develop passive immunity and prevent or lower the evidence and severity of enteritis infections.

By the end of 1983 and 1984 calving seasons, a total of 173 first calf heifers have been used to evaluate the use of Vicogen®. Heifers used were Herford and Angus X Herford crossbreds that were randomly assigned to treatment by age of pregnancy and breed type. In January of each year the heifers were sorted into their assigned groups and vaccinated with Vicogen® bacterin or kept as controls. Three weeks later the heifers were given a 3 cc booster vaccination of Vitamins A & D (500,000 I.U. Vitamin A and 75,000 I.U. Vitamin D per cc) and a 7-way Clostridum booster vaccination.

Both groups of heifers were housed in uniform but separate calving areas approximately 6 acres in size. These areas are equipped with a slotted board fence for wind protection and an automatic waterer. Both calving areas are adjacent to smaller corrals and a maternity barn. As the heifers calved, they were moved into the smaller corrals until they were mothered up and the calves were nursing well. Those heifers requiring assistance at calving were moved directly into the maternity barn. Following delivery the heifer and her calf were usually moved outside into the corrals within 24-48 hours. Groups of cows and calves 4-7 days old were then transferred to a clean ungrazed forty acre pasture.

All heifers were self-fed mixed alfalfa-crested hay using large round bales fed in 8 foot diameter steel hay feeders. Following calving the heifers were fed five pounds of grain (70% oats and 30% wheat mixed) bulked up with chopped hay daily. In addition they had access to mixed hay and limited grazing. Portable 8 X 8 foot plywood calf shelters provided weather protection for the calves.

All births were recorded showing birth weight, birth date, type of delivery, sire and time of calving. Heifers were checked and assisted when necessary on an every three hour schedule around the clock.

All calves were closely watched to see if they nursed and were accepted by their mothers. All calves were checked daily and those showing signs of diarrhea or scours were caught and treated with Sulkamycin-S boluses at the rate of one bolus per fifty pounds body weight. Calves were retreated whenever it was deemed necessary. Cost of the Sulkamycin-S bolus was approximately 32¢ per bolus or 60¢ per treatment assuming the calf weighed about 100 pounds.

A summary for the two calving seasons in this investigation is shown in Table 1, and a brief summary of weather data is shown in Table 2.

Summary:

A study of this type needs more years of varying weather conditions to draw conclusions relative to the effectiveness of a compound such as Vicogen®. The two seasons in which this study has been in progress no calves have been lost to enteritis, although a calf in the control group required special treatment by a veterinarian in 1984.

Substantially more calvings need to be evaluated before this compound can be rated for its effectiveness in controlling calf enteritis.

Table 1. Summary of Scours Incidence, Treatments, and Economics among Heifers Vaccinated with the E. Coli Bacterin Vicogen® and Un-vaccinated Control Heifers. 1983 and 1984 Calving Seasons

	Vaccinated with Vicogen®		Control	
	1983	**1984**	**1983**	**1984**
No. Head	59	31	55	28
Percent born by month:				
February	1.7	0	0	0
March	67.8	61.3	60.0	46.4
April	27.1	35.5	38.2	53.6
May	3.4	3.2	1.8	0
No. live calves	58	31	54	26
Calving %	98.3	100	98.2	92.8 1/
Calves treated for scours:				
Heifers	5	2	7	1
Bulls	9	3	9	1
Total	16	5	16	3
% treated	24.1	16.1	29.6	10.7
No. treatments/calf	1.5	1.2	1.4	1.3
Range of treatments	(1-3)	(1-2)	(1-2)	(1-3)
Vaccination cost/heifer $	$ 1.80	$ 1.80	----	----
Treatment cost/lot $	$ 12.60	$ 3.24	$13.80	$31.94 2/
Treatment/calf, ¢	.90	.64	.86	10.64
Avg. age in days of calf treated				
Heifers (range in age)	10.2 (8-16)	11 (11)	12.3 (10-16)	8 (8)
Bulls (range in age)	13.6 (6-27)	9.6 (6-14)	12.3 (8-19)	5 (1-9)

1/ 2 calves born dead – not scours related

2/ Veterinarian needed for one very sick calf; successful response

Table 2. 1983 and 1984 Weather Conditions During Calving Season

1983	Feb.	March	April	May
Avg. Maximum Temperature, °F.	37.6	36.4	50.4	62.1
Range, °F.	11-58	21-57	31-68	32-86
Avg. Minimum Temperature, °F.	16.6	20.3	24.4	34.4
Range, °F.	-4-28	3-30	10-44	21-48
Precipitation				
Snow on ground, inches	1	1.5	1.75	9
Rain & melted snow, inches	.05	.95	.32	1.15
Sky Conditions				
Days cloudy	19	21	7	18
Days clear	9	10	23	13

1984	Feb.	March	April	May
Avg. Maximum Temperature, °F.	43.4	36.4	54.5	65.7
Range, °F.	24-58	14-65	28-69	47-91
Avg. Minimum Temperature, °F.	16.6	14.8	27.1	35.3
Range, °F.	-8-29	-12-31	14-38	17-54
Precipitation				
Snow on ground, inches	1	15.5	28.5	0
Rain and melted snow, inches	.11	1.0	2.9	.05
Sky Conditions				
Days cloudy	11	21	16	15
Days clear	18	10	14	16

References:

1/ Makarechian, M. and S.D. Acres. "Effectiveness of Two Vaccines in Reducing the Incidence of Calf Scours", the 60th Annual Feeders Day Report, Department of Animal Science Faculty of Agriculture and Forestry. The University of Alberta, Edmonton, Alberta, Canada. June 12, 1981.

2/ Makarechian, M. and S.D. Acres. "Economic Aspects of Vaccination Against Calf Scours", the 61st Annual Feeders Day Report, Department of Animal Science Faculty of Agriculture and Forestry. The University of Alberta, Edmonton, Alberta, Canada. June 10, 1982.

3/ Schipper, I. A. and D. Landblom, S. Pommer, T. J. Conlon. "Calf Enteritis Investigation", the 32nd Livestock Research Roundup. Dickinson Experiment Station, Dickinson, North Dakota. October 13, 1982.

4/ Spire, Mark. "Five-point Scours Program Outlined", Tri-State Livestock News. P.O. Box 129, Sturgis, South Dakota 57785. Saturday, April 2, 1983.

Optimum Vaccination Time
For Feeder Calves

By

Dr. I.A. Schipper, D.G. Landblom, J.L. Nelson
V. Anderson, R. Danielson and T. Stromberg

A cooperative study under the direction of Dr. I.A. Schipper, formerly of the Veterinary Diagnostic Laboratory, North Dakota State University, Fargo, was conducted at three Branch Experiment Stations (Dickinson, Carrington, and Streeter) and the Main Station, N.D.S.U., Fargo to determine the effect that vaccination time has on feeder calf antibody production.

Investigations have demonstrated that it requires two administrations of either inactivated or attenuated vaccine to achieve maximum antibody titer. It is also well established that a three week period between vaccinations is necessary to obtain maximum antibody titer from the second, or booster vaccination.

It has been repeatedly demonstrated that when cattle are under stress the serum corticosteroid levels increase. Increased corticosteroid levels interfere with the immunological activity of the animal's immune system. Weaning is a stress period. The usual practice of vaccination at weaning is frequently recommended without justification based on documented experimental data that would indicate the degree of protection obtained from such procedures.

The purpose of this investigation is to determine the immunological response of feeder calves following vaccination at pre-weaning, weaning, and post weaning.

To evaluate the various vaccination times calves received two intramuscular vaccinations of inactivated IBR and BVD vaccine at three week intervals according to the following schedule:

Group I	Vaccinated twice, initially at six weeks and then booster at three weeks before weaning.
Group II	Vaccinated twice, initially at three weeks before weaning and boostered on weaning day.
Group III	Vaccinated twice, initially one day post-weaning and three weeks after weaning.

All calves were bled before each vaccination and three weeks following the final vaccination. Blood serum antibody titers for IBR and BVD have been determined by serum neutralization for each period of blood sampling.

In addition, personnel at the Carrington Irrigation Station, under the direction of Vern Anderson, Animal Scientist, administered inactivated BVD vaccine intranasally.

The combined results from all Stations are shown for attenuated BVD virus vaccine in Figure 1, and Figure 2 depicts results from calves used at the Dickinson Experiment Station only.

Summary:

Several things were gleaned from this study that should be useful to cattlemen in their animal health program, but will no doubt require additional work. First, there was no measurable difference in the quantity of antibodies produced by either attenuated or inactivated vaccines, and, regardless of the type of vaccine, it requires two vaccinations to produce maximum blood serum levels of antibodies. Very minimum, or no antibody production was produced following the first administration of either attenuated or inactivated vaccine.

It appeared from the antibody analysis that if passive immunity exists at the time of initial vaccination there will be an antibody loss which will be quantitively replaced following a second vaccination. However, if the calf has been exposed to natural infection previous to the initial vaccination, the initial vaccination will stimulate antibody production comparable to a booster vaccination.

Weaning does influence antibody response following vaccination if weaning occurs at initial or at the time of the booster vaccination. The result is decreased antibody titer and more rapid decay of antibody titer when vaccination and weaning occur simultaneously.

The last information gleaned from this investigation was that when attenuated IBR virus vaccine was administered intranasally no increase in blood serum antibody titer was detected.

This years' calf crop will be used to evaluate the interval required between the initial vaccination and the booster vaccination. While we know that a three week interval will generate strong antibody titers, the question rises as to the strength of antibody titers when booster vaccinations are given at either one or two week intervals as well as three week intervals.

Figure 1: BVD Vaccination Versus Weaning.

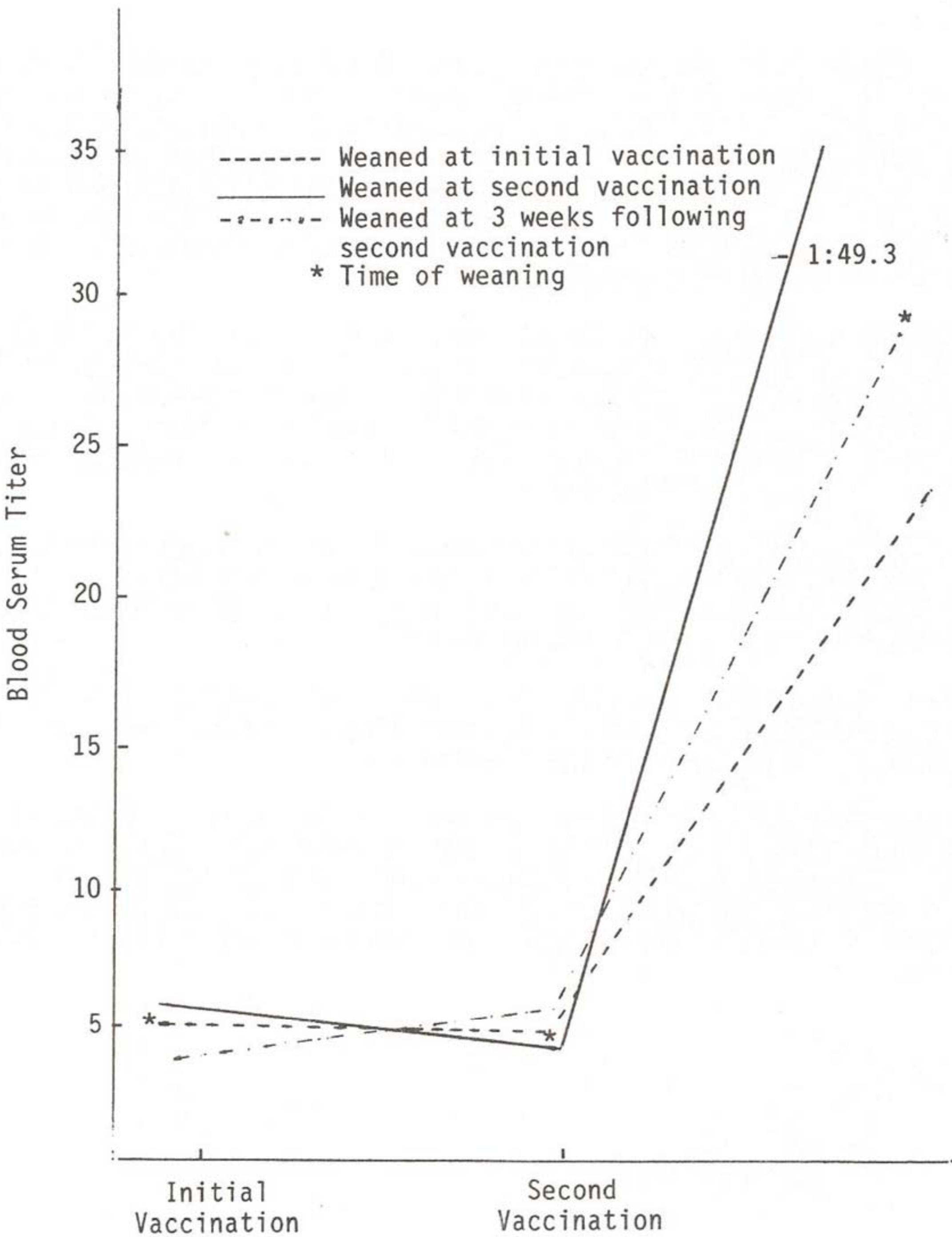
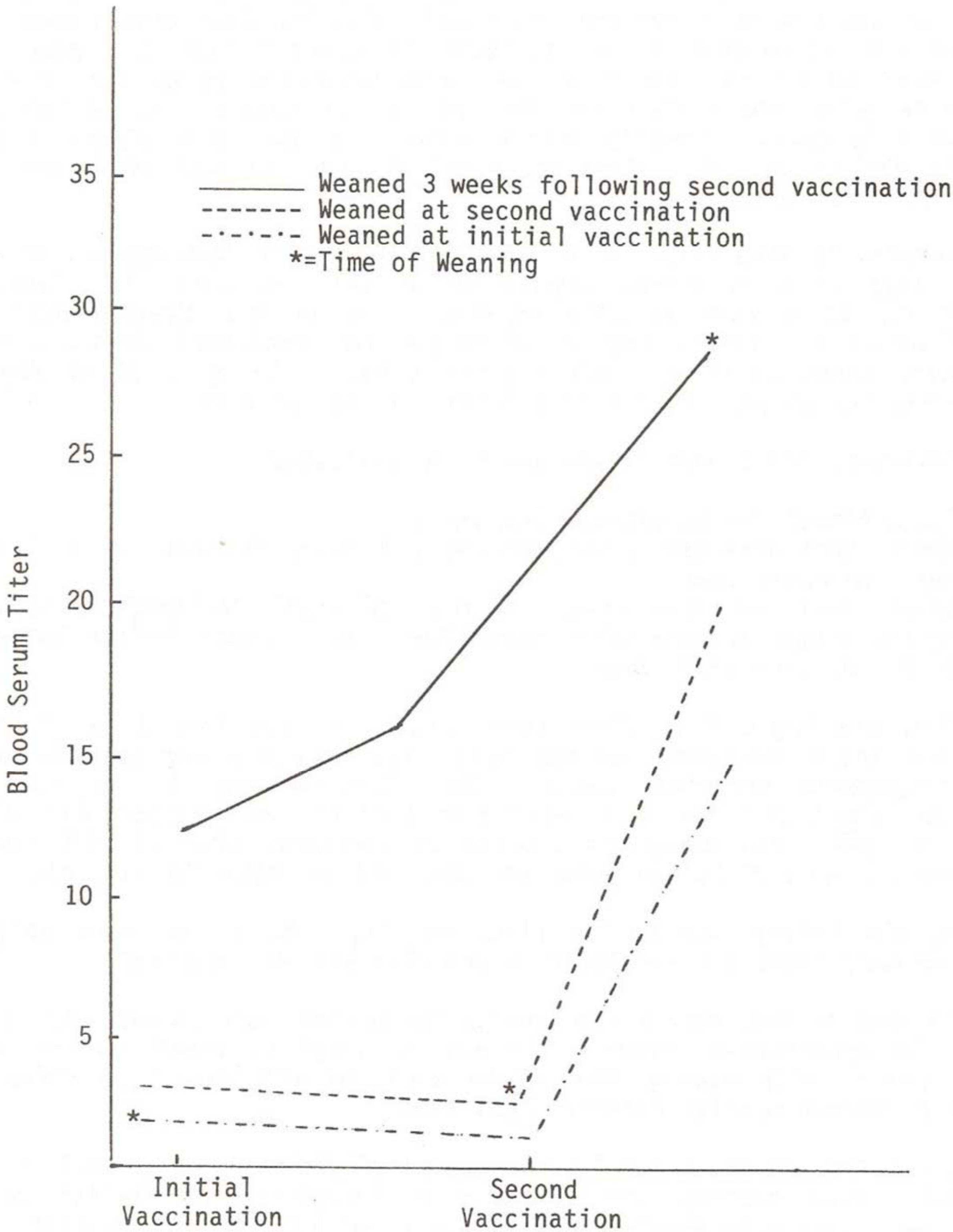


Figure 2: Dickinson Experiment Station BVD Titers



Weaning Management Study

By

D.G. Landblom and J.L. Nelson

Stress, trauma, weight loss, and an undesirable amount of sickness characterize the events experienced by a calf that has just been weaned. These events are stimulated by a multitude of changes that a freshly weaned calf must adjust to, the first and most traumatic being the calf's loss of association and protection provided by its mother. In addition, when the calf is weaned directly into a drylot, it must also adjust to changes in its environment, feed type and physical form, as well as in many cases, dusty lots and water type.

The purpose of this trial is to evaluate three different methods of weaning that range from an abrupt separation of cow and calf and placement in a drylot, to a step by step weaning in which all changes don't occur simultaneously. Stress may be minimized and continued strong gains may be experienced using a transitionary scheme. Using a 30-40 day backgrounding period any carry over effects will be measured.

The following three comparisons are being evaluated:

1. Conventional drylot weaning (control).
2. Short term pre-wean creep feeding (28 days) followed by drylot weaning with creep feed.
3. Short term pre-wean creep feeding (28 days) followed by weaning on native range pasture with creep feed for 2 weeks before being moved to drylot with creep feed.

Hereford and Angus X Hereford cows ranging in age from 3 to 13 years of age and their crossbred calves have been randomly assigned to each of the treatments described above. This investigation is in its' second year and began with the fall weaning of 1982 and was repeated the following fall in 1983. The study was started on September 29th of both years and weaning was done on October 27th one year and the 28th the next year.

During the thirty day period after weaning, the calves were weighed at 7 or 10 days intervals and their weight fluctuations recorded.

At the end of the thirty day monitoring period, the calves were switched from the experimental weaning rations to complete mixed rations and fed in a short backgrounding program to evaluate the long term effects that these different weaning methods might have.

Group I served as the control group and received minerals as their only supplement. When weaning, the calves were transported by trailer to drylot pens where they were started on complete mixed low energy with high roughage rations shown in Table 1.

Group II cows and calves grazed native range as did Group I but had access to a self-fed creep ration consisting of 62% dry rolled oats, 33% dry rolled barley, 5% molasses and Vitamins A and D. When weaned, they too were transported by trailer to drylot pens but the ration available was the self-fed creep ration just described and chopped mixed hay in the bunkline. The creep ration was fed in portable wooden creep feeders.

Group III calves were creep fed on native pasture exactly like the calves in Group II. When weaned, however, the calves remained on native range and self-fed creep rations for an additional two weeks and then were moved to drylot where they received the self-fed creep ration and chopped mixed hay in the bunkline as described for Group II.

When the trial was started in late September, all calves were booster vaccinated with a 7-way clostridium bacterin.

Ration composition used is shown in Table 1.

Feed consumed and economics of each phase of the investigation are shown by feeding year in Tables 2 and 3. These values have not been averaged to show fluctuations.

Fluctuations in daily gains among the various experimental groups are shown by calendar year in Table 4.

Summary:

1. Weaning calves using any one of the methods being evaluated was done without complications. Calves weaned on pasture were not a problem. However, it must be noted that the cows were pastured a considerable distance from their freshly weaned calves.

2. Weight changes following weaning fluctuated substantially both within years and between years during the 30 day period after weaning. The conventially weaned calves had the widest fluctuation. This group of calves lost weight during the first 5-7 days in drylot. Once they stopped bawling and really went to eating, they took on tremendous fills resulting in weight gains approaching 4 pounds per day. Calves that were given creep feed for 28 days before weaning bawled for their mothers, but were at the feeders more and walked the fenceline less. Based on the steady gains and less fluctuation in gains following weaning it is evident that the creep fed calves experienced less stress.

3. Calves weaned on pasture had the slowest gains but also demonstrated the least erratic gain pattern following weaning. This indicates that the customary practice of separating calves from cows and moving them immediately to a drylot environment is stressful in addition to the separation of calf and mother.

4. Illness followed an interesting pattern. No illness has been encountered in calves weaned on pasture until they were moved into drylot. Illness in all of the weaning methods has been limited, and in nearly all cases response to treatment was good. In one case, however, a control group heifer died of pneumonia.

5. Short term (28 days) fall creep feeding before weaning cost an average $3.59 per calf. Creep feed consumption was 75 pounds and cost $.0478 cents/pound. Only one experimental group remained on pasture after weaning and their average creep feed consumption increased to 87.7 pounds (range 63.6 to 112.1) for the additional two weeks spent on pasture. Feed for this period cost an average $4.27 (range $3.14 to $5.39).

   Calves creep fed on pasture and weaned directly into drylot with creep feed and chopped mixed hay in the bunkline posted the best overall performance gaining an average 16 pounds more during the entire study than the control group. Using a calf value of 65¢ per pound an average gross return of $10.40 per calf can be realized from this system. The net return over creep feed for this group using this economic model would be $6.81.

6. This study will be continued one more weaning season to see if differences measured the past two seasons continue.

Table 1. Creep Feed and Complete Mixed Rations Used

Creep Feed			
Dry Rolled Grain Mixture:			
Oats, %	62		
Barley, %	33		
Molasses, %	.5		
Vitamin A, IU/lb.	5,000		
Vitamin D, IU/lb.	500		
Mixed Ration:	**Base Ration**	**1st Change**	**2nd Change**
Mixed Hay, %	74	64	54
Dry Rolled Oats, %	25	35	45
T.M. Salt, %	.5	.5	.5
Di cal, %	.5	.5	.5
Vitamin A, IU/lb.	5,000	5,000	5,000
Complete Mixed Growing Ration:			
Mixed Hay, %	54		
Dry Rolled Oats, %	45		
T.M. Salt, %	.5		
Di cal, %	.5		
Vitamin A, IU/lb.	5,000		
	100%		

Table 2. Feed Consumption and Economics among Calves Comparing Three Weaning Management Methods Fall 1982

	Control Conventional Weaning	Pasture Creep Drylot Wean- W/Creep	Pasture Creep Pasture Wean- W/Creep Drylot W/Creep
Number Head	26	25	26
Creep Feed Before Weaning, lbs.		1422	2154
Lbs./Head		56.9	82.8
Total Creep Cost, $		68.28	103.66
Creep Cost/Hd., $		2.73	3.99
Creep on Pasture after Weaning, lbs.			1654
Lbs./Head			63.6
Total Creep Cost, $			81.70
Creep Cost/Hd., $			3.14
Pasture Cost/Hd., $			3.20
Drylot Phase:			
Mixed Hay, lbs.		1735	922
Cost/Head, $		2.08	1.06
Creep Feed, lbs.		6518	2060
Cost/Head, $		12.19	3.72
Mixed Ration, lbs.	24941	12742	14192
Cost/Head, $	36.31	19.65	21.37
Total Cost, $	36.31	36.65	36.48
Total Gain, lbs.	102	111	95
Cost/Lb. Gain, ¢	35.5	33.0	38.4
Treatments:	1 lung cong. 2 coccidiosis	2 lung cong. 1 hardware disease	2 lung cong.

Table 3. Feed Consumption and Economics among Calves Comparing Three Weaning Management Methods Fall 1983

	Control	Pasture Creep Drylot Wean-W/Creep	Pasture Creep Pasture Wean-W/Creep Drylot W/Creep
Number Head	16	17	17
Creep Feed Before Weaning, lbs.		1400	1300
Creep Lbs./Head		82.4	76.5
Total Creep Cost, $		67.38	62.57
Creep Cost/Head, $		3.96	3.68
Creep Feed on Pasture after Weaning, lbs.			1906
Creep Lbs./Head			112.1
Total Creep Cost This Phase, $			91.69
Creep Cost/Head, $			5.39
Pasture Charge/Calf, $			3.20
Drylot Phase:			
Mixed Hay, lbs.		2325	720
Cost/Head, $		4.44	1.38
Creep Feed, lbs.		5655	1920
Cost/Head, $		15.20	5.16
Complete Mixed Ration, lbs.	18217	11870	10330
Cost/Head, $	44.73	27.98	24.36
Total Cost/Head All Phases, $	44.43	51.59	43.17
Total Gain/Head, lbs.	137.0	159.9	135.6
Feed Cost/Lb. of Gain, $	.3243	.3226	.3184
Treatments:	1 heifer died due to pneumonia		1 steer scoured

Table 4. 1982 and 1983 Daily Gain Changes among Calves Weighed at Selected Intervals during the Month Following Weaning

1982 Weaning	Selected Intervals			Average 30 Day Post Weaning Gain
	Nov. 3	Nov. 16	Nov. 26	
Days between each weighing	7	13	10	30
Treatment 1: Conventional-weaning (Control)	-2.06	3.36	.01	1.11
Treatment II: Pasture Creep-Drylot Wean With Creep	-.15	2.75	-.01	1.15
Treatment III: Pasture Creep/Pasture Wean with Creep/ Drylot with Creep	1/	.77	1.61	.97
1983 Weaning	**Nov. 7**	**Nov. 17**	**Nov. 28**	
Days between weighings	10	10	11	31
Treatment 1: Conventional-weaning (Control)	4.00	.38	2.11	2.16
Treatment II: Pasture Creep Feed Drylot Wean W/Creep	2.45	.55	3.18	2.10
Treatment III: Pasture Creep/Pasture Wean-Drylot with Creep	2.15	.20 2/	1.11	1.16

1/ Weaned on pasture one week after Groups II and III.

2/ Moved from fall pasture into drylot on Nov. 17th.

Fluorescent Lighting as a Calf Enteritis Control

By

Dr. I.A. Schipper, D.G. Landblom & J.L. Nelson

When evaluated on an economic scale, calf enteritis (diarrhea) ranks as one of the major economic problems facing producers of beef cattle. Calf diarrhea takes its toll in several ways: cost of treatment, death loss and irrepairable damage to the intestinal lining that results in reduced performance ("poor doers"). Research across this country has put great emphasis on studying calf enteritis with some degree of success. In some cases, however, success has been mixed because organisms have a tremendous ability to develop resistance to drugs used for treatment. Vaccines that have been introduced in recent years have been highly promoted and studied at this Station and all of the combined herds in the North Dakota State University system, with little or no success. The best results have been obtained when calving areas are rotated by years and no cattle are allowed in the special calving areas during other times of the year. Most recently, fluorescent lighting has been suggested as being yet another method to control enteritis in young calves.

An evaluation of fluorescent lighting has been underway during the past two calving seasons using Hereford and Angus X Hereford cows and their newborn calves. Cows were housed and wintered in large gestation pastures with shelter belt and slotted board fence wind protection. Each morning during the early part of the calving season cows and their newly born calves were moved in to feedlot pens equipped with wind protection and portable calf shelters. One half of the lots had shelters equipped with six fluorescent light fixtures that were kept lighted 24 hours a day. Unconfined cows were also monitored that nursed their newborn calves on clean ground. A detailed record of scours treatment and frequency of treatment was kept. Initially a scouring calf was treated with one Sulkamycin-S® bolus per 50 lbs. of body weight. When the enteritis condition was more advanced, but dehydration was not apparent, a 5 cc intramuscular injection of Tylan 200® was also administered.

A summary of scours treatments, frequency and effectiveness of fluorescent lighting is shown in Table 1.

A summary of weather conditions during the 1983 and 1984 calving season is shown in Table 2.

Summary:

Fluorescent lighting reduced the incidence of scours by 11.1% among confined calves.

Calves and their mothers that were not confined but were housed on clean ground had significantly less scours cases and of the few cases encountered only a very small number required a second treatment. Cost for treatment in this group amounted to $5.12. Costs for treatment in the confined control groups and confined group with fluorescent lights were $24.81 and $18.87 respectively.

These data concur with other researchers and stockmen that have known for years that housing cows and calves in confined muddy lots results in a much higher incidence of calf scours.

Table 1. Incidence, Treatments, and Treatment Costs among Calves Compared in Fluorescent Light Study

	Confined Control	Unconfined Control	Confined with Fluorescent Lights
1983:			
No. Head	21	93	21
No. Scouring	14	12	6
No. Treatments Required			
1	10	11	5
2	3	1	1
3	1	1	1
% Scouring	66.6%	12.9%	28.5%
1984:			
No. Head	24	85	24
No. Scouring	11	4	14
No. Treatments Required			
1	6	4	9
2	5	0	3
3	0	0	1
% Scouring	45.8%	4.7%	58.3%
Combined % Scouring	55.5%	8.9%	44.4%
Combined Treatment, Cost -			
1983	$13.57	$3.84	$ 4.25
1984	$11.24	$1.28	$14.62
Total, $	$24.81	$5.12	$18.87

Table 2. Weather Conditions during March, April and May at Ranch Headquarters in 1983 and 1984

1983	March	April	May
Average Maximum Temperature, °F	35.7	50.4	62.2
Range	20-59	28-69	86-32
Average Minimum Temperature, °F	20.7	25.4	35.3
Range	-2-33	13-46	22-49
Precipitation, Inches	1.12	.21	1.53
Snow	17	2.5	5.75
Rain	0	0	.72
Sky conditions 1/			
Not enough days recorded			
1984			
Average Maximum Temperature, °F	35.4	54.4	66.0
Range	11-63	69-24	92-47
Average Minimum Temperature, °F	15.1	28.3	36.2
Range	-16-35	12-41	19-55
Precipitation, Inches	.38	2.87	T
Snow	6.45	14.0	0
Rain	.01	.65	T
Sky conditions 1/			
Days Cloudy	17	21	16
Days Clear	9	6	11

1/ Sky conditions not available on some days.

Effect of Breeding Yearling Heifers to Texas Longhorns VS Other Breeds To Increase Longevity and Total Production

By

J.L. Nelson, D.G. Landblom and T.J. Conlon

Large calves cause a lot of calving difficulty for heifers. The associated stress causes heifers to be less likely to recycle and remain in the herd.

There are several ways to try to improve conception rate and calving ease. One of current interest is to breed yearling beef heifers to Texas Longhorns, which are known to produce small calves at birth. Small birth weights lead to more calving ease. This easier calving may leave heifers in better condition to recycle and conceive the following year, thus improving their chances of remaining in the herd. However, heifers bred to Texas Longhorn bulls wean lighter calves. This might be made up by producing more calves in the following years.

The costs of maintaining a cow are very high. A cow weaning a calf every year, starting as a two year old, is obviously desirable.

The purpose of this study was to see if lifetime production of cows bred as yearlings to Texas Longhorn bulls was the same as the lifetime production of cows bred to other beef breeds as yearlings.

Two mating schemes were established to see if breeding yearling beef heifers to Texas Longhorns (TLF) or other beef breeds (OTF) would increase longevity and/or lifetime weaning weight production. Eight hundred records over eight years were obtained. The weaning weight was adjusted to 205 days for sex of calf and age of cow. Breeding heifers to Texas Longhorns did result in easier calving for two year olds. In subsequent years, the heifers bred to Texas Longhorn bulls to calve as two year olds, had about the same difficulty as cows bred to other breeds as two year olds. The conception rate of heifers bred to Texas Longhorns was lower. These cows also had a lower conception rate in following years than cows in the OTF class. Thus, the easier calving of the TLF class as two year olds did not improve the conception rate in subsequent years. The average age and the average number of years in herd for each class was the same. The total lifetime production adjusted weaning weight per cow was the same in each class. The reason for longevity and total production being the same for both classes may be due to the poor conception in the Texas Longhorn class.

Briefs of Incomplete Trials

The new compound Chem-Cast® was used to castrate bull calves this spring and is being compared to calves castrated in a conventional manner. Measurements being taken include: ease of injection, amount per calf over 150 pounds, cost per calf and effects on weaning weight. Complete results will be ready after weaning.

AN EVALUATION OF IMMUNE RESPONSE IN WEANLING AGE BEEF CALVES GIVEN BOOSTER VACCINATIONS AT SELECTED INTERVALS

I.A. Schipper, D.G. Landblom, J.L. Nelson and H.M. Smith

OBJECTIVES:

The primary objective when using vaccines is to prevent infectious disease. This objective is too frequently not obtained because of incorrect administration of the biological product. Investigations at this station to identify the method that would generate the most immune response revealed that very minimal, or no antibody production was produced following a single vaccination; and that regardless of the type of vaccine used (modified live or inactivated) two vaccinations were required to produce maximum blood serum levels of antibodies (Schipper et al, 1984). It was also found that when weaning and vaccination occurs simultaneously, antibody titer is decreased and that a more rapid decay of antibody titer occurs. When the previous work being discussed was done, and interval of three weeks was used between the initial and booster vaccinations. The purpose of this present investigation is to identify the interval between the initial and booster vaccinations that will promote maximum antibody response among weanling age beef calves.

PROCEDURE:

Calves weighing approximately 450-550 pounds of multiple breeds and of both sexes were utilized in this investigation. The biological agent used was an inactivated trivalent (Infectious Bovine Rhinotrachetis – IBR, Bovine Virus Diarrhea – BVD, and Para Influenza – 3-PI-3) vaccine administered according to the manufacturers recommendations. In the vaccination protocol 46 calves served as controls and were intermingled with the treated groups but received no vaccine. One group of 39 calves received a single administration (5 ml) of the trivalent vaccine when the experiment began. Three other treatment groups comprised of 38 to 40 calves each were given an initial vaccination of the trivalent vaccine and were then given booster vaccinations at either one, two or three week intervals.

All calves were bled on vaccination day, on the day that booster vaccinations were given and six weeks following the initial vaccination. Blood serum was obtained, frozen and forwarded to the Veterinary Diagnostic Laboratory, NDSU where it was titered for antibodies to IBR, BVD and PI-3 viruses present in the trivalent vaccine.

RESULTS:

IBR

Over the six week period of this investigation, control calves did not exhibit major changes in blood serum antibody levels. All calves, regardless of the frequency or interval that a booster vaccination was administered exhibited a definite blood serum titer decay. The greatest antibody titer response was detected in those calves given a booster vaccination two weeks following the initial vaccination. (Figure 1)

BVD

Calves in the control group exhibited a slight increase in blood serum antibody titer between the three and six weeks period of the investigation. A similar slight increase occurred in varying degrees between the three and six week period for those calves given an initial vaccination only and those given booster vaccinations at one and two weeks after the initial challenge. A major increase in blood serum titer was observed for those calves given a booster vaccination three weeks following the initial vaccination. (Figure 2)

PI-3

The controls exhibited a steady increase in blood serum titer over the six week period investigated. Administering a booster vaccination two weeks following the initial challenge generated the greatest increase in blood serum titer to PI-3. With the exception of the control group of calves, all calf groups exhibited a similar increase in serum antibody titer following the three week period of the investigation. (Figure 3)

Comparison of Immune Response for IBR, BVD, and PI-3 Antigens

Figure 4 provides a comparison of blood serum antibody response for each disease antigen in the trivalent viral vaccine when administered initially followed by a second administration at three weeks. The IBR vaccine provided the least antibody response and an antibody decay between the third and sixth week of the study. Greatest antibody response was detected by those calves receiving the PI-3 antigen following the three week booster vaccination.

DISCUSSION:

IBR

Response among calves given the IBR (Herpes virus) antigen was substantially less than that observed among calves receiving either BVD or PI-3 vaccine. Also these data clearly indicate that IBR blood serum antibody decay occurs soon after maximum post-vaccination titers are observed.

The blood serum titer decay observed is characteristic for nearly all Herpes viruses and has led to the suggestion that continuous multi-vaccinations must be utilized to maintain a maximum level of antibody for protection from Herpes virus diseases. While this would maintain maximum antibody levels, it is an impractical approach.

BVD

The results relating to the immune response among calves vaccinated with BVD virus indicates that there is little protection provided animals vaccinated only once, or receiving a second administration at one or two weeks following initial vaccination. When comparing BVD and IBR antibody titers, BVD exhibited a greater antigenic activity. It is apparent from these data that those animals receiving a second vaccination three weeks after the initial vaccination for BVD would have the greatest opportunity to develop maximum protection against BVD virus.

Blood serum titers to BVD were detected at the time initial vaccinations were made, indicating that calves in this investigation had experienced natural infections to BVD virus and had developed some immunity before the vaccination sequence began.

PI-3

A steady increase in blood serum titer to PI-3 virus was detected in the control animals indicating that PI-3 virus was present in the calves in advance of the vaccination program. It would also appear that the stress of handling and crowding resulted in a rapid and extensive spread of the PI-3 virus among all animals involved. This would result in a consistent titer increase among vaccinated and unvaccinated calves. Results obtained for PI-3 virus demonstrate that it is a virus that spreads rapidly throughout all calves brought together and that by the end of the six week study period all calf groups had developed strong antibody titers.

SUMMARY:

To obtain maximum antibody levels to the three viral strains tested would require administering an initial vaccination to IBR and PI-3 followed by a booster vaccination two weeks later. And in the case of BVD virus, maximum antibody production would be obtained by giving an initial vaccination for BVD followed by a booster vaccination at three weeks. While this would provide the best protection it is impractical to handle cows and their calves so often. The best alternative is to use a trivalent vaccine (IBR, BVD and PI-3) giving an initial vaccination and following it with a booster vaccination two weeks later.

If one is to establish and maintain maximum blood antibody titers to IBR virus it will be necessary to follow one initial vaccination with IBR vaccine with routine booster vaccinations at six week intervals, which is impractical.

The PI-3 virus is everywhere in the young calf and when they are subjected to the stress of vaccination, handling and crowding there is an extensive spread of this viral agent. The infection under stressful conditions results in the establishment of high blood serum antibody titers by six weeks following the initiation of the stressful period.

REFERENCES:

Schipper, I.A., D.G. Landblom, J.L. Nelson, V. Anderson, R. Danielson and T. Stromberg. 1984 Optimum Vaccination Time for Feeder Calves. North Dakota Agr. Expt. Sta., Dickinson Branch, 34th Livestock Research Roundup, pp. 38.

Figure 1: IBR Vaccination.

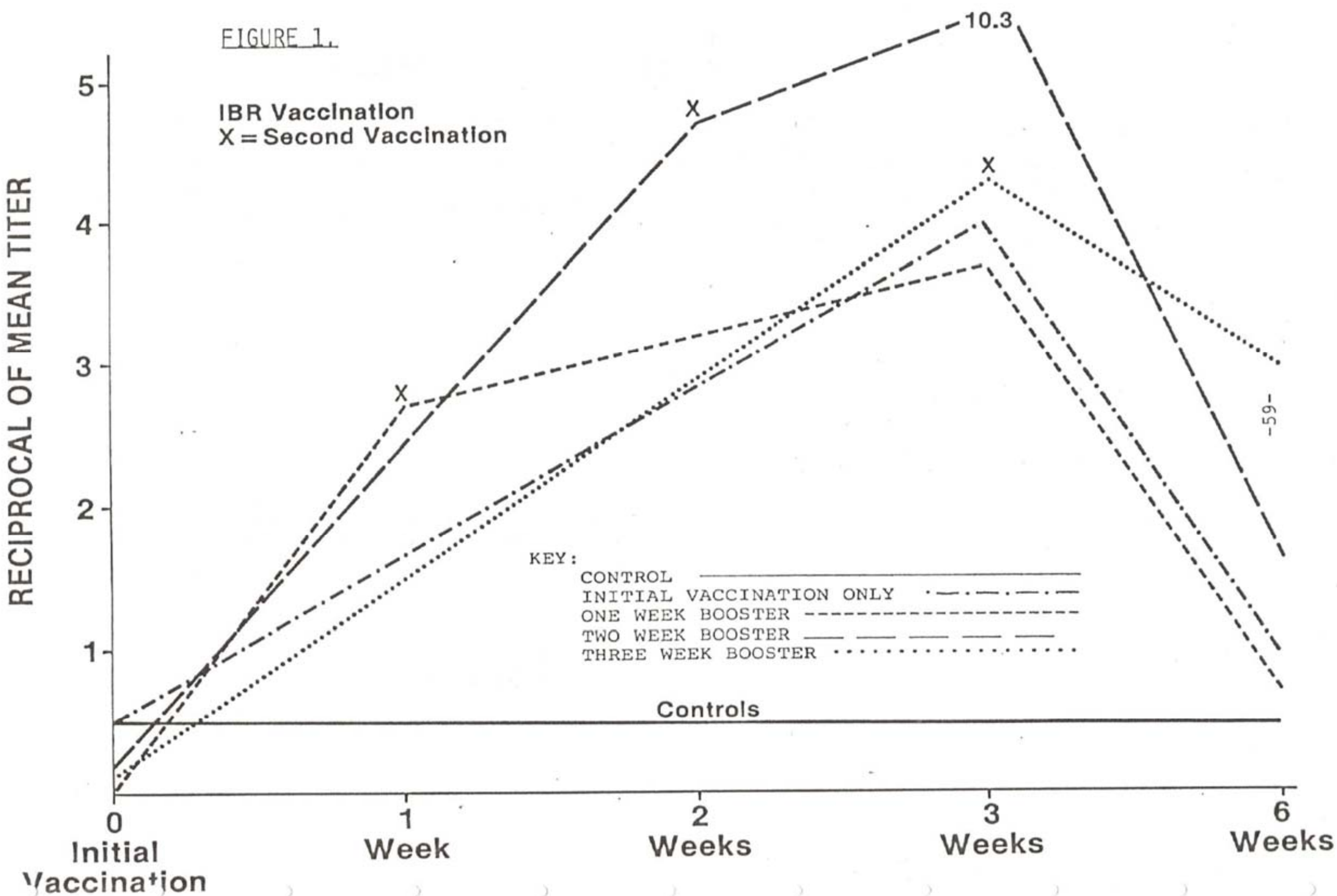


Figure 2: BVD Vaccination.

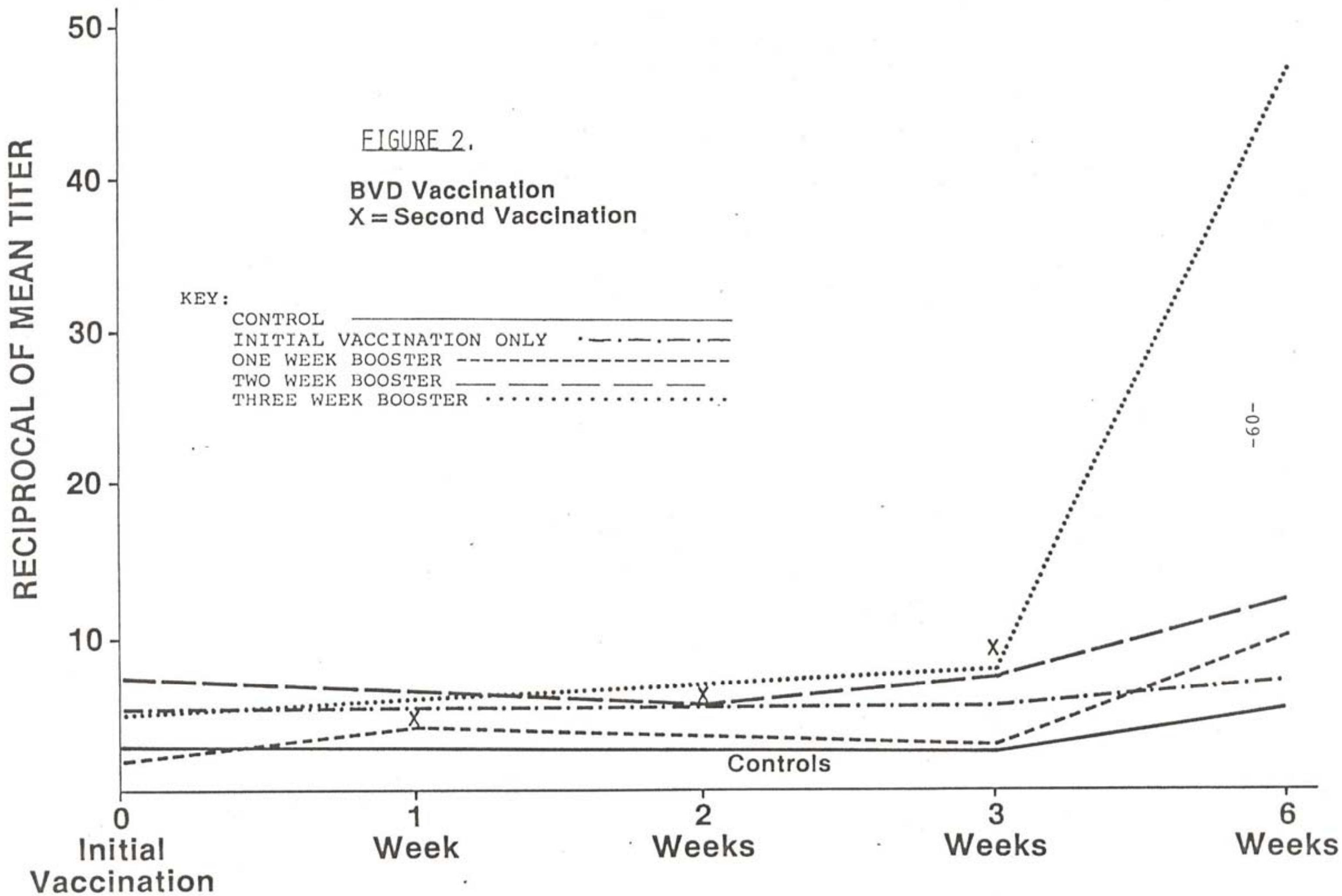


Figure 3: PI-3 Vaccination.

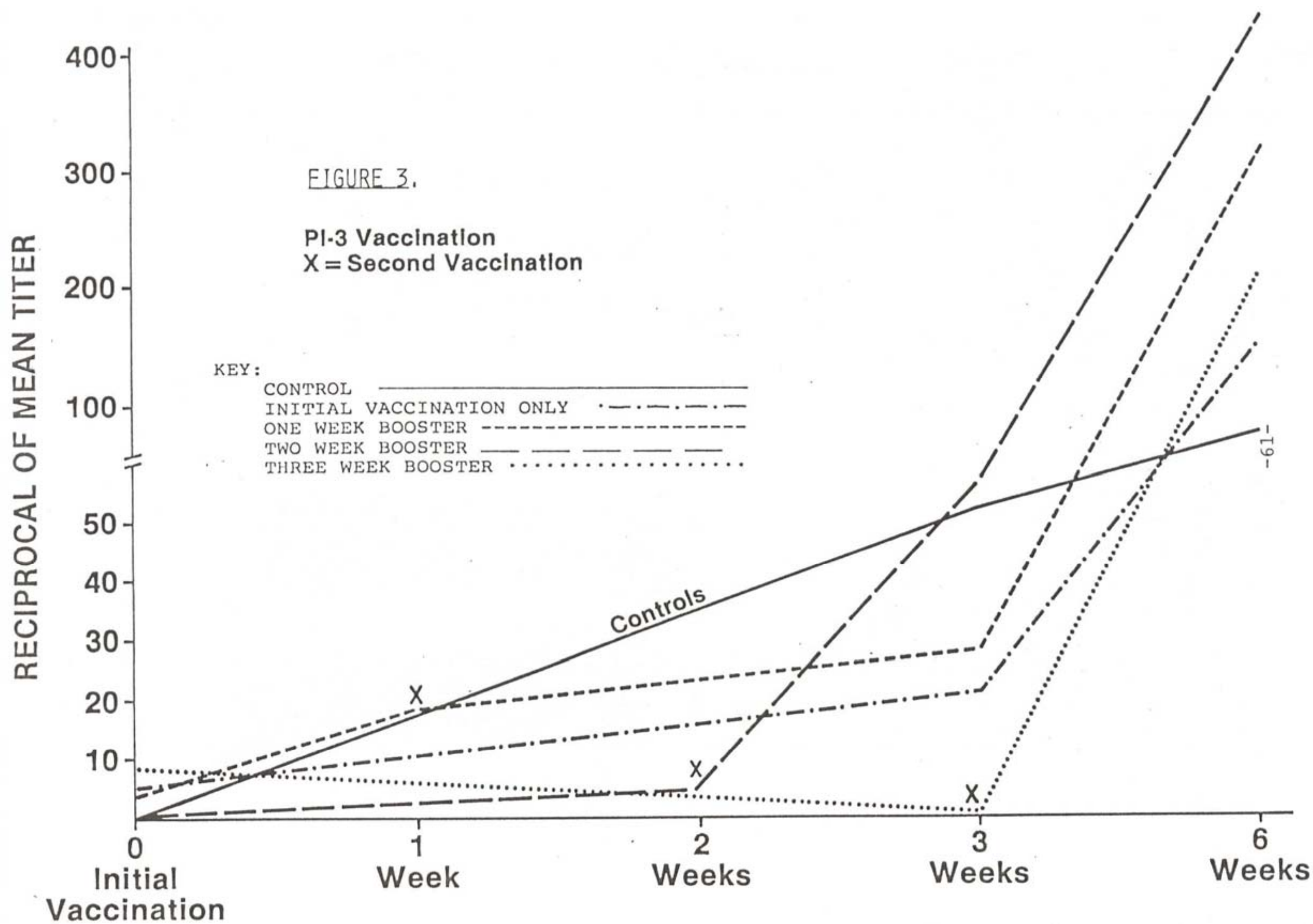


Figure 4: Comparison of Immune Response for IBR, BVD, and PI-3 Vaccines