

1951
ANNUAL REPORT

DICKINSON EXPERIMENT STATION
DICKINSON, NORTH DAKOTA

LIVESTOCK INVESTIGATIONS

BY

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BEEF COW WINTERING TRIALS WINTER 1950-51

Objective:

In recognition of the ever-present need for making the best use of all livestock feed produced, the Dickinson Experiment Station started a series of winter feeding trials with beef cattle in the winter of 1950-51 and are continuing them this winter. We believe that reliable information obtained from trials in Western North Dakota setting forth certain minimum feeding standards for wintering pregnant beef cows will be of great financial value to the many beef producers of this area.

Present Status:

November 1, 1951, marked the beginning of the second year of this experiment. The original 4 lots have been retained and 2 additional lots of beef breeding cows are on trials this winter.

The 24 five-year old cows, 9 two-year old cows, and 10 yearling heifers comprising the beef breeding herd at the Dickinson Experiment Station were divided into 4 equal lots on the basis of age, weight, and past breeding record on November 1, 1950. Each lot of 10 cows was quartered in an open shed 16 ft. x 37½ ft. with an adjacent exercise lot leading to a feed rack and water tank. Feed was loaded into wagons, weighed on a 10 ton platform scale, and pitched into feed racks beside the fence once each day. Individual weights were taken at the beginning of the experiment and once each month thereafter. All lots were provided with a bonemeal and salt mixture at all times.

An outline of the experiment setting forth initial weights and rations fed is given in Table I. Table II summarizes the first year's results.

Lots I and II were fed at a rate computed to be adequate for wintering beef cows, while Lots III and IV were allowed just 75% of that amount. Ration I consisting of 30.04 lb. corn silage and 9.73 lb. crested wheatgrass hay per cow per day proved to be sufficient to maintain the body weight of cows throughout the 195 days of winter feeding. These 10 cows raised 6 calves and the 6 cows that nursed calves until October 30, 1951, averaged 14 lb. heavier on that date than they were one year earlier. These 6 calves averaged 454 lb. at 216 days of age when weaned.

Ration II consisting of 30.13 lb. corn silage and 9.95 lb. prairie hay was slightly less effective in keeping body weights up during the winter, yet the 8 cows that weaned calves from Lot II were 43 lb. heavier October 30, 1951 than they were 1 year earlier. The 8 calves were weaned at an average age of 220 days weighing 446 lb.

Cows on Rations III and IV all lost weight during the winter. Ration III was 22.53 lb. corn silage and 7.38 lb. crested wheatgrass hay and Ration IV was 22.55 corn silage and 7.46 prairie hay. The 10 cows in Lot III averaged 118 lb. lighter May 14, 1951, than when the winter feeding started. Lot IV cows were 98 lb. lighter at the close of winter feeding than at the start. The 7 cows that raised calves in Lot III were 10 lb. lighter October 30, 1951, than they were one year earlier. Cows raising calves in Lot IV showed the greatest loss in weight for the year, 85 lb. per head. This great loss of weight is partially accounted for by the fact that all 4 cows raising calves in Lot IV were mature cows, whereas all other lots had some young cows raising calves. Lot III calves averaged 418 lb. at 216 days of age and Lot IV calves were the heaviest of all lots at 462.5 lb. when weaned at 218 days. Again this great difference can be partially explained by the fact that all Lot IV calves were from mature cows. When weaning weights of calves from mature cows only are compared, Lot II were heaviest at 510 lb., Lot I followed at 497.5, then Lot III at 476 and the lightest were Lot IV at 462.5.

Birth weights appeared to be independent of the feed level of the dams. Among mature cows, Lot II had the heaviest calves at birth and Lot IV had second heaviest. The first calf was dropped Feb. 27, 1951, and the last cow to calve calved May 1, 1951. We lost one calf from each lot at birth. Several of the cows were not with calf. The practice of breeding these cows for early calves only, which was a carry-over from previous years, has been discontinued, and a normal breeding season was scheduled this summer.

As is indicated in Table II, May 14, 1951, marked the close of the winter feeding period. Cow and calves were trucked to a section of good pasture land known as Pyramid Park in the Badlands, where they remained until September 19. They were trailed back 35 miles to the Dickinson Experiment Station and allowed to glean from the fields on the Station from September 20 to October 30 when weighing for this winter's trials was begun.

Eighteen yearling heifers have been added to the cow herd allowing us to keep 6 lots of 10 cows each for the winter 1951-52. The same rations as were fed last year will be fed plus two other rations containing Soybean meal.

Conclusion:

1. Two lots of beef breeding cows were successfully wintered in 1950-51 on rations of about 30 lb. corn silage and 10 lb. hay, and two other lots wintered on rations of about 75% of these amounts.
2. Cows raising calves on the lower rations were about 100 lb. lighter October 30, 1951, than one year earlier.
3. Birth weights of calves appeared to be independent of dam's feed level.
4. When age of dams is taken into consideration, calves from the lower fed lots of cows weaned lighter than calves from well wintered cows.
5. These results are all based on only one year's results; the same trials are repeated and expanded for winter 1951-52.

Table I. Cow Lots for 1950-1951 Winter Feeding Trials

Dickinson Experiment Station, Dickinson, North Dakota

Lot No.	Cow No.	Weight	Calves Raised	Ration
I	1	1140	3	
	20	1320	1	
	25	1195	2	
	26	1080	3	
	29	1110	3	
	33	1015	2	
	40	690	1	
	43	935	--	
	H-2	620	open hfr.	Lot I Ration
	H-32	705	bred hfr.	10 lb. crested wh. hay
	Tot. Wt.	9810		30 lb. corn silage
H-29	775	Alternate	T.D.N. 8.98 lb.-N.R. 1:8.5	
II	7	1170	3	
	11	1125	3	
	19	1220	3	
	21	985	3	
	28	1355	2	
	36	1050	3	
	38	875	--	
	41	720	1	
	H-10	685	bred hfr.	Lot II Ration
	H-22	625	open hfr.	10 lb. prairie hay
	Tot. Wt.	9810		30 lb. corn silage
37	945	Alternate	T.D.N. 8.86-N.R. 1:16.4	
In Lots I & II 7 lb. ground barley & oats were fed each cow from calving time until May 14, when all cattle went to pasture.				
III	8	1080	3	
	13	1100	3	
	15	1210	3	
	18	1215	2	
	30	1050	2	
	35	1220	3	
	42	770	1	
	44	770	--	
	H-8	685	bred hfr.	Lot III Ration
	H-27	730	open hfr.	7.5 lb. crested wh. hay
	Tot. Wt.	9830		22.5 lb. corn silage
H-13	745	Alternate	T.D.N. 6.74-N.R. 1:8.5	

Table I (Continued):

Lot No.	Cow No.	Weight	Calves Raised	Ration
IV	5	1365	2	
	6	1095	3	
	10	1245	1	
	14	1035	3	
	27	1050	3	
	32	1180	3	
	45	670	1	
	46	775	1	
	H-20	660	open hfr.	
	H-26	740	bred hfr.	
	Tot. Wt.	9815		
				In Lots III & IV 5.25 lb. ground barley & oats were fed each cow from calving time until May 14, when all cattle went to pasture.

A mix of 2 parts crushed rock salt to 1 part steamed bonemeal will be kept before all lots at all times. Cows numbered 1 through 36 are 5 yrs. old; 37 and up are 2 yrs. old.

Table II. Summary First Year Beef Cow Wintering Trials
At Dickinson Experiment Station 1950-1951

	Lot I	Lot II	Lot III	Lot IV
Number of cows*	10	10	10	10
Days on winter feed	195	195	195	195
Daily // Corn silage	30.04	30.13	22.53	22.55
Winter // Crested W. grass hay	9.73		7.38	
Ration // Prairie hay		9.95		7.46
Lbs. // Ground Oats & barley**	7.00	7.00	5.25	5.25
Initial Wt. Oct. 31, 1950	981	981	983	981.5
Calving Wt. ***	1041.5	1014.0	932.5	933.0
At Close of winter feeding- May 14, 1951	995.5	958.5	865.0	884.0
At close of summer grazing- October 30, 1951	1073.0	1026.5	1023.0	1056.5
Avg. gain – Oct. 31, 1950 – Oct. 30, 1951	92.0	45.5	40.0	75.0
Year's gain or loss for cows that raised calves	+ 14.2	+ 43.1	-10.0	-85.0
No. calves born	7	9	8	6 (one injured calf sold as vealer)
No. calves lost	1	1	1	1
No. calves weaned	6	8	7	4
Mean birth Wt.	72.7	72.5	68.3	75.0
Birth wt. from mature cows only	73.5 (4)	78.2 (5)	73.0 (4)	75.0 (4)
Oct. 31, 1951 Mean weaning wt.	454.2	446.2	417.9	462.5
Weaning Wt from mature cows only	497.5 (4)	510.0 (5)	476.2 (4)	462.5 (4)
Mean weaning age – days	215.83	220.25	216.14	217.50
Mean wt. per day of age	2.104	2.026	1.933	2.126

* 6 Cows in each lot were 6 years old in Spring of 1951, 2 in each lot were 3 years old in Spring of 1951, and 2 in each lot were 2 years old in Spring of 1951.

** A mixture of ground oats and barley 1:1 was fed from calving until May 14, 1951.

*** Weight immediately prior to calving or in case of dry cows April 30, 1951.

All lots were provided with a mixture of 2 parts salt to 1 bonemeal at all times.

BEEF CALF WINTERING TRIALS 1950-51

Objective:

To compare the economy of feeding beef calves well over winter to go on grass in the spring with limited feeding in winter to go on grass in the spring.

Present Status:

One year's work has been done on this experiment which was designed to be repeated as long as necessary to establish a definite pattern of results. Twenty-six Hereford calves, of which 7 were steers and 19 heifers, were weaned September 23, 1950, and fed roughage with a small allowance of grain in dry lot until lotted for this experiment November 1, 1950. It was planned to feed one lot about 30 lb. of silage, 4 lb. crested wheatgrass hay, and 2 lb. of threshed oats per calf per day and give the other lot only 20 lb. of silage and 4 lb. of crested wheatgrass hay per calf per day. A mineral mixture of 2 parts salt to 1 part bonemeal was kept before the calves in both lots.

There were 2 small temporary silos filled with barley and oats silage which was to be fed to all calves as long as it lasted. While it was not the design of the experiment to compare cereal silage with corn silage, the difference in palatability and gains produced by the two types of silage was so striking that the weights fed and calf weights have been incorporated into the results summarized in Table III.

The cereal silage was dark in color, and had an odor somewhat different from that of normal silage. It was not possible to get the calves to take 30 lbs. of this silage per day even though hay was reduced in an attempt to force them to eat more cereal silage.

Lot B calves which received no oats lost 19 lb. per head during the 3 month period that cereal silage was fed. Lot A calves showed a gain of 44 lb. during the same period, probably in a large measure due to the oats in the ration. After about February 1, 1951, when corn silage replaced cereal silage, the calves became more thrifty and began to make good gains. It was noted that 30 lb. was still a rather heavy feed of silage in addition to 4 lb. of hay and 2 lb. of oats. Lot A calves gained 111 lb. per head in 3½ months on about 28 lb. corn silage, 4.4 lb. crested wheatgrass hay, and 2 lb. of oats per head per day. Lot B calves gained 87 lb. during the same period on about 20 lb. of corn silage and 4.7 lb. of hay per head per day.

Average daily gains were .796 lb. per day for Lot A calves and .343 lb. per day for Lot B calves during the 196 day winter period. This represented a difference in total gains of about 87 lb. per head in favor of the better fed calves.

On May 15, 1951, all calves were turned on good native grass where they remained until September 19, 1951, when they were brought in to clean up the grain fields until October 30. Lot B calves made about 47 lb. per head greater gains on grass than did their well wintered neighbors. The total gain for the year still favored the well wintered calves by 41 lb. per head. The value of this additional 41 lb. was almost evenly balanced against the greater cost of winter feed. There appeared to be no great difference this year in the profit from the two levels of wintering when summer grazing followed. Our computations indicate that we earned \$1.42 per calf less money on the well wintered calves than on the poorly wintered calves.

Conclusion:

One year's results showed no significant difference in the profit that may be realized from two levels of wintering beef calves provided summer grazing on good range follows the winter feeding.

Table III. Summary of Calf Wintering Trials – 1950-51

	Lot A	Lot B
Number calves	13	12*
Days on winter feed	196	196
Days on summer pasture – 1951	168	168
Daily ration - 1 st 3 months of winter	22.5 cereal silage (oats & barley) 3.48 crested whtgr.hay 2 oats	17.04 cereal silage (oats & barley) 3.58 crested whtgr. hay
Daily ration – last 3½ months of winter	28.2 corn silage 4.41 crested whtgr.hay 2 oats	19.98 corn silage 4.69 crested whtgr. hay
Avg. daily ration – entire winter	25.54 silage 3.97 crested whtgr.hay 2.0 oats	18.59 silage 4.13 crested whtgr. hay
Nov. 1, 1950 – Initial wt.	443.9	457.5
Wt. at end of 3 months	488.1	438.3
Wt. at end of winter feeding (May 14, 1951)	599.2	525.4
Avg. daily gain per calf (winter)	.796	.343
Wt. off grass Oct. 30, 1951	749.2	722.1
Avg. daily gain on grass	.893	1.171
Total year's gains	305.3	264.6
Profit over feed cost for winter period per calf	\$8.12	-\$4.57 (Loss)
Profit over feed cost for entire year per head Nov.1, 1950 – October 30,1951	\$56.73	\$58.15

*Both lots originally had 13 calves, but one orphan heifer in Lot B accidentally drowned Jan. 22, 1951. All data pertaining to that calf have been removed from this summary.

Prices used in computation of profit: silage \$10.00 ton, Hay \$20.00 ton, Oats .72 bushel, calves 32¢ as of May 15, 1951; and yearlings at 34¢ as of October 30, 1951 or 5½ months grazing calculated at \$1.00 per head per month.

SWINE PASTURING TRIALS – 1951

Objective:

To compare several summer pastures for growing and fattening swine and to learn which pasture crops are best suited for swine pastures in the West River Area.

Present Status:

Seventy feeder pigs averaging about 32 lb. were purchased at a local auction ring in July, 1951, and after being numbered, weighed, and given a worm capsule were placed in seven equal groups to start the first swine feeding project at the Dickinson Experiment Station. Five pasture plots of 1 acre each had been seeded in May and June to each of the following crops: spring rye, winter rye, rape & oats, winter wheat, and Sudan grass. One plot of 3 yr. old alfalfa was also included in the trials. Ten pigs of about equal wt. were placed in each of the 6 pasture plots and 10 were placed in dry lot on July 21, 1951.

The ration fed for the first 10 days consisted of ground barley and oats with soybean meal and blood meal, in proportions set forth in Table IV. After 10 days the oats were taken out of the ration and after 40 days the only protein concentrate fed was soybean meal. The dry lot received the same ration as the pasture lots except that twice as much protein concentrate was fed. All lots were hand fed twice a day. A mineral mixture of 1 part salt, 1 part bonemeal, and 1 part limestone was kept in boxes in each lot.

The experiment was closed September 24 after 65 days because most of the pastures were short of green feed and the weather was too chilly for pigs that had no protection.

Daily gains ranged from .85 lb. in Lot I, spring rye, to 1.00 lb. in Lot V, alfalfa. The Dry lot pigs gained .94 lb. per day. Daily feed consumption was about 3.1 lb. per pig in all pasture lots, but somewhat higher in the dry lot.

Feed consumed per 100 lb. gain was lowest in the alfalfa lot at 314.7 lb. and highest in the spring rye lot at 363.1 lb. Cost of 100 lb. gain was highest in the dry lot and lowest in the alfalfa lot.

This pasture trial produced no startling results but it appeared to merit another trial next year. We were unable to begin the trials earlier this summer because the fencing was not finished earlier.

Conclusion:

A 65-day pig pasturing experiment was conducted using 10 pigs averaging 32 lb. in each of 6 one acre pasture lots and 1 dry lot. Alfalfa pasture produced the greatest total gains and the most economical gains, followed by a rape and oats pasture. Gains were above average in dry lot but the cost was higher than in any pasture lot.

Table IV

	Sp. Rye	W. Rye	Rape & Oats	W. Wheat	Alfalfa	Sudan Grass	Dry Lot
No. Pigs	8*	10	10	10	10	10	10
Days on Trial	65	65	65	65	65	65	65
Total Initial Wt.	272	315	316	317	318	317	317
Avg. Initial Wt.	34.0	31.5	31.6	31.7	31.8	31.7	31.7
Total Final Wt.	717	895	929	909	968	908	932
Avg. Final Wt.	89.6	89.5	92.9	90.9	96.8	90.8	93.2
Total Gain/Pig	55.6	58.0	61.3	59.2	65.0	59.1	61.5
Avg. Daily Gain	.856	.892	.943	.911	1.00	.910	.946
Total Feed/Lot	1616	2000	2000	2005	2045	2025	2203
Feed/Day/Pig	3.11	3.08	3.08	3.08	3.15	3.12	3.39
Feed/100 lb. gain	363.1	344.8	326.0	338.7	314.7	342.7	358.2
Feed Cost/100 lb. gain exclusive of pasture	\$7.75	\$7.36	\$6.96	\$7.22	\$6.71	\$7.31	\$8.03

*Two pigs were lost early in experiment. Two substitute pigs were used in this lot throughout the test but their wt. data were not included in summary.

1st 10 days – Ration for all pasture lots – 300 barley, 100 oats, 10 soymeal, 5 animal protein.

1st 10 days – Ration for dry lot – 300 barley, 100 oats, 20 soymeal, 10 animal protein.

10th – 40th day – Ration for all pasture lots – 400 barley, 10 soymeal, 5 animal protein.

10th – 40th day – Ration for dry lot – 400 barley, 20 soymeal, 10 animal protein.

40th – 65th day – Ration for all pasture lots – 400 barley, 20 soymeal.

40th – 65th day – Ration for dry lot – 400 barley, 40 soymeal.

A mineral mixture of 1 part salt, 1 part bonemeal, 1 part limestone, was fed free choice to all lots.

**TWO TYPES OF SUDAN TESTED FOR PRUSSIC
ACID POISONING BY PASTURING WITH SHEEP**

Objective:

The Dickinson Experiment Station cooperated with the Department of Agronomy at N.D.A.C. to test the relative poisoning potential of two types of Sudan grass by pasturing yearling wethers on similar 2 acre lots.

Present Status:

Twelve wethers were borrowed from Mr. Ray Gress of Dickinson and 6 were placed in each pasture lot August 1, 1951. One lot had been seeded to standard sweet Sudan and the other to low HCN Sudan furnished by the Agronomy Department.

Mr. Gress called for his sheep October 8, 1951, so they were taken out at that time. Both lots had made similar gains of about 11 lb. per head and none of the animals in either lot ever showed any symptoms of prussic acid poisoning.

Conclusion:

No symptoms of prussic acid poisoning of sheep were demonstrated on either sweet Sudan or low HCN Sudan in this trial.

A DEMONSTRATION FARM POULTRY FLOCK - 1951

Objective:

To raise a farm poultry flock at the Dickinson Experiment Station in such a manner as to be a credit to the Station. The number and breed of chickens to be raised is to be about what we can recommend to farmers of the West River Area who wish to keep a farm flock.

Present Status:

Two old sheds were overhauled in March, 1951, and rebuilt into a brooder house 12 x 20 ft. to accommodate 500 chicks. We bought 500 day old White Plymouth Rock chicks from the Poultry Department at N.D.A.C. on March 30, and placed them under 2 electric brooders. A commercial starter was fed initially and changed at 5 weeks to home mixed mash and scratch grains.

The cockerels were separated from the pullets when 7 weeks old and were finished to sell as fryers averaging over 4 lb. at 13 weeks of age.

The pullets were ranged on alfalfa range from their 10 to 22nd week when they were housed in a newly remodeled laying house 20 x 36 ft.

Egg production climbed to a satisfactory $\frac{2}{3}$ of maximum within one month and the project is now paying its way with some to spare.

We are satisfied with the flock for this first year of the demonstration and hope to continue the poultry project. Table V shows the major points of the poultry work thus far in 1951.

Table V. Demonstration Farm Poultry Flock

Breed and No.	520 straight run White Plymouth Rocks
Date hatched and delivered	March 30, 1951
Size and type brooder	12 x 20 house with 2 electric hovers
Starter used	Commercial chick starter in crumb form of 18% protein
Started feeding scratch grain	4 weeks of age
Cockerels removed	7 weeks of age
Pullets to alfalfa range	10 weeks of age
Cockerels reached 4 lb.	12 weeks of age
Cockerels marketed	13 weeks of age
Starter consumed per bird	2.6 lb. to 5½ weeks of age
Home mixed mash consumed	6.8 lb. to 12 weeks of age
Scratch grain consumed	3.5 lb. to 12 weeks of age
Total feed cost per chick	12.9 lb. feed cost 44.8¢ to 12 weeks of age
Avg. price received per cockerel	\$1.46
Profit over feed cost per cockerel	\$1.01
Total losses to 12 weeks	3% of original number (16 birds)
Pullets housed	234 were housed at 22 weeks of age (Sept. 4, 1951)
Total Feed Consumed per Pullet	2.6 lb. starter, 16.2 lb. mash, 8.8 lb. grain
Total Feed Cost per Pullet Housed	27.6 lb. feed cost 87.0¢ to 22 weeks of age
Method of feeding layers	20% protein home mixed mash plus grains
Percent egg production – October, 1951	67%

PERSONAL ACTIVITIES

Conferences away from headquarters:

Jan 8-13 Branch Station Superintendent's Meeting, Fargo

Public Meetings Attended:

Date	Meeting	Attendance
Dec. 5 & 6	Poultry – Dairy Institute, Dx.	100
Dec. 11	Livestock Field Day, Dx. Experiment Station	300
Feb. 22	Annual Farmers Week, Beach	100
Feb. 23	Twelfth Annual Farmers Institute, New England	Several hundred
Mar. 5-7	Valley City Winter Show	
Mar. 15	Glen Ullin & New Salem Vet. Agr. Groups	22
Mar. 30	Wintering Cattle, Bowman	85
Apr. 9	New Classes Planned for Vet. Agr. Training	6
Apr. 12	New Salem & Glen Ullin Vet. Agr. Classes, Tour of Stn.	18
Apr. 13	West River Livestock Grain & Hay Show	16
Apr. 23	West River Livestock Grain & Hay Show	14
May 18	Biology Students Visited Station	22
May 18	West River Livestock Grain & Hay Show	12
June 5	4-H Livestock Judging Contest, Taylor	50
June 6-8	N.D. Stockmen's Meeting, Fargo	Several hundred
June 13	Mercer Co. Stockmen's Meeting at Beulah	25
June 21	Mercer Co. Vet. Agr. Class, Tour of Station	44
June 29	Dx. Expt. Stn. Crops Field Day	500
July 10-11	Board of Higher Education, Tour of Station	6
July 23	Minot Station Field Day, Tour of N. Central Ex. Stn.	150
July 24	Fruit Tour of Dickinson Orchard & near Dickinson	75
July 25	Rotary Club Meeting, Tour of Station	35
July 25	Bowman Homemakers Club, Tour of Station	20
Aug. 3	Vet. Agr. Classes of Dickinson, Tour of Station	75
Aug. 21	Vet. Agr. Class of Belfield, Tour of Station	30
Aug. 24	4-H Girls & Leaders of West River Area, Tour of Stn.	45
Aug. 28	Vet. Agr. Classes of Killdeer	10
Sept. 1	Slope Co. Farmers Fair, Livestock Judging	200
Oct. 1-5	West River Livestock, Grain & Hay Show, Dickinson	Several hundred

News Releases:

Release Date	Title
Dec. 12	“Cattle Wintering Trials that have been undertaken at the Dickinson Experiment Station”
Jan. 2	“Turkeys, Like Cattle, Respond to Good Feed and Care”
Jan. 23	“A Beef Cow Wintering Experiment – Progress Report”
Feb. 22	“The Economics of Turkey Production in North Dakota this Year”
March 8	“Cereal Silage – 1950”
March 29	“Start Chicks for Farm Flock Now”
April 19	“Good Pastures Pay Good Dividends”
May 17	“Creep Feed Suckling Pigs on Pasture for Rapid Growth”
July 12	“Give Chicks the Best Feed and Care to Finish Them for an Early Market”
Aug. 9	“Pig Pasturing Experiment is Started at Dickinson Experiment Station”
Sept. 6	“Management of the Pullet Flock at Housing Time”
Oct. 4	“Experimental Cattle are Trailed Back to Dickinson from Badlands”
November 1	“Good Feed and Management Will Keep the Laying Flock on the Job All Winter”

Radio Programs:

Date	Radio Station	Program
Aug. 9	Radio Station KDIX	Pig Pasturing Experiment
Sept. 6	“ “ “ “	Management of Pullet Flock
Oct. 4	“ “ “ “	Cattle are Moved to Home Pasture
Nov. 1	“ “ “ “	Keep the Laying Hens on the Job

Publications:

Bi-Monthly Bulletin	Sept. – Oct., 1951	Four years Work with Turkeys at the Dickinson Experiment Station
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