

## **SYSTEMS OF PRODUCING YEARLINGS**

### **Preliminary Report**

The beef cattle industry in North Dakota is one of a cow-calf system where most of the calves are sold at weaning. Recently interest has increased in the possibility of “conditioning” the calves prior to sale and even to the wintering of the calves prior to sale. The production of yearlings would permit the rancher to increase the gross income, to market roughages and grains to advantage and possibly utilize labor and facilities more efficiently.

#### **Experimental Design**

The design of the experiment to investigate systems of producing yearlings is outlined in Table 1 as a three phase approach. Phase 1 was the wintering of calves to provide two levels of growth (or gain), a low level of about 1/2 to 3/4 pounds per day and a moderate level of about one to 1¼ pounds per day. Four lots of calves fed on each level to permit a further evaluation of level of wintering on the subsequent phases of pasture or dry lot and in a finishing phase in dry lot.

On Phase 2, two lots from the low level and two lots from the moderate level of wintering were put on a brome-crested wheat grass pasture for 80 to 90 days. During Phase 3 one lot from each level of wintering was brought into dry lot and put on full feed of barley and corn silage to slaughter weights. The other two lots were left of the pasture and fed about one-half of a full-feed of grain as long as the pasture would carry them (this was 56 days in '67-68 and only 27 days in '68-69) and were then finished in dry lot.

The other four lots from Phase 1 were left in dry lot during the summer on two different treatments during this growing period. Two lots were fed one-half feed of grain (about one pound of grain per 100 lbs. body weight daily) and all the corn silage they would clean up. The other two lots were started on full feed. In Phase 3 all lots were put on full feed and finished to slaughter weights. The steers were sold on carcass grade and yield at West Fargo and carcass evaluations made.

The “average” rations fed are given in Table 2. They were similar for both experiments. The prices quoted in Table 3 were used for both experiments to permit ease of evaluating treatments and not necessarily to show actual profits for each year. Further a price of \$27.00 per cwt. of calves was used both years to make better comparisons in “break-even” costs for both years.

## SYSTEMS OF PRODUCING YEARLINGS

**Table 1. Experimental Design**

Lots		Phase 1 (1967-68)-(190 days) (1968-69)-(197 days)	Phase 2 (90 days) (83 days)	Phase 3	Total days on experiment	
1967-68	1968-69				1967-68	1968-69
9	10	Low Level Wintering	Pasture	Dry Lot Full Feed	413	398
10	13	Low Level Wintering	Dry Lot Full Feed	Dry Lot Full Feed	363	398
11	12	Low Level Wintering	Dry Lot 1/2 grain	Dry Lot Full Feed	363	398
12	11	Low Level Wintering	Pasture	1/2 Grain on Pasture (1) Dry Lot Full Feed	413	398
13	15	Moderate Level Wintering	Pasture	1/2 Grain on Pasture (1) Dry Lot Full Feed	413	398
14	17	Moderate Level Wintering	Dry Lot Full Feed	Dry Lot Full Feed	342	358
15	16	Moderate Level Wintering	Dry Lot 1/2 Grain	Dry Lot Full Feed	342	358
16	14	Moderate Level Wintering	Pasture	Dry Lot Full Feed	363	358

(1) 1967-68 – Fed grain on pasture for 56 days then 67 days in dry lot.  
1968-69 – Fed grain on pasture for 27 days then 91 days in dry lot.

**Table 2. Systems of Producing Yearling's Rations Fed (1967-688)**

Feed	Lots	Phase 1		Phase 2			Phase 3			
		9-10	13-14	9-12	10-14	11-15	9-16 <sup>(1)</sup>	12-13	10-14	11-15
		11-12	15-16	13-16						
Crested Brome Hay, lbs.		4	4	Pasture	----	----	----	----	----	----
Corn Silage, lbs.		20	25	Pasture	30	46	23	23	28	25
Alfalfa Hay, lbs.		----	----	Pasture	1	1	1	1	1	1
Barley (Rolled), lbs.			2	Pasture	9	6	12	12	12	12
Soybean Oil Meal, lbs.		----	----	Pasture	1	1	1	1	1	1
Mineral Mix, lbs.		0.2	0.2	Pasture	0.2	0.2	0.2	0.2	0.2	0.2
<sup>(1)</sup> Fed about 7 pounds of barley on pasture (August 7-October 3)										
Feed	Lots	Rations Fed (1968-69)						Phase 3		
		Phase 1		Phase 2			10-14	11-15 <sup>(1)</sup>	13-17	12-16
		10-11	14-15	10-11	13-17	12-16				
		12-13	16-17	14-15	13-17	12-16	10-14	11-15 <sup>(1)</sup>	13-17	12-16
Crested Brome Hay, lbs.		4	4	Pasture	----	----	----	----	----	----
Corn Silage, lbs.		22	25	Pasture	26	49	25	23.5	26.2	27.2
Alfalfa Hay, lbs.		----	----	Pasture	1.5	1.5	1.5	1.5	1.5	1.5
Barley (Rolled), lbs.		----	3	Pasture	9.7	5.8	15.5	10.4	15.0	13.5
Soybean Oil Meal, lbs.		----	----	Pasture	----	----	----	----	----	----
Mineral Mix, lbs.		0.2	0.2	Pasture	0.2	0.2	0.2	0.2	0.2	0.2
<sup>(1)</sup> Fed about 6 pounds of barley on pasture (September 5-October 1)										

**Table 3. Prices and Energy (TDN) Values Used**

<b>Feed</b>	<b>TDN%</b>	<b>Price</b>
Barley	75	\$ 0.96/bu.
Alfalfa Hay	50	\$25.00/Ton
Soybean Oil Meal	78	\$90.00/Ton
Crested Brome Hay	46.5	\$18.00/Ton
Corn Silage	16.5	\$ 7.20/cwt.
Mineral Mix	----	\$ 4.80/cwt.
Rolling of Grain	----	\$ 2.00/cwt.
Calves (At Start of Experiment)		\$27.00/cwt.

**SYSTEMS OF PRODUCING YEARLINGS (1967-68)**

**Table 4. Summary of Results Entire Experiment**

<b>Lots</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>
Days on Experiment	413	363	363	413	413	342	342	363
Initial Wt. Lbs.	398	387	398	398	398	399	399	398
Final Wt. Lbs.	1051	993	1006	1047	1119	1064	1048	1040
Avg. Daily Gain, Lbs.	1.58	1.67	1.67	1.57	1.74	1.94	1.90	1.77
TDN/lb. Gain, Lbs. <sup>(1)</sup>	4.40	5.47	5.54	3.92	3.92	5.21	5.32	3.93
Avg. Carcass Grade <sup>(2)</sup>	9.2	8.5	8.5	7.6	8.6	9.1	8.5	8.6
Dressing <sup>(3)</sup>	59.5	57.7	58.9	58.2	59.3	59.3	58.5	57.5
Cost per cwt. Gain <sup>(4)</sup>	\$11.70	\$14.76	\$14.89	\$9.95	\$10.32	\$13.93	\$14.00	\$10.35

(1) Energy from pasture lots not included.

(2) 7 = low good; 8 = Avg. good; 9 = High good; 10 = Low Choice, etc.

(3) Based on final wts. at Dickinson, hot carcass wts. at West Fargo one day later.

(4) Does not include any pasture costs for lots 9, 12, 13, 16.

**SYSTEMS OF PRODUCING YEARLINGS (1967-68)**

**Table 5. Summary of Results of Phases**

<b>Lots</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>
<b>Phase 1 – 190 Days</b>								
<b>Treatment</b>	<b>Low Level of Wintering</b>				<b>Moderate Level of Wintering</b>			
Initial Wt., Lbs.	398	387	398	398	398	399	399	398
Wt. end of Phase 1, Lbs.	512	488	496	510	636	634	631	663
Avg. Daily Gain, Lbs.	0.59	0.60	0.58	0.57	1.22	1.20	1.19	1.38
TDN per lb. Gain, Lbs.	8.5	8.5	8.9	8.7	5.7	5.8	5.8	5.1
<b>Phase 2 – 90 Days</b>								
<b>Treatment</b>	<b>Pasture</b>	<b>F.F.</b>	<b>1/2 grain</b>	<b>Pasture</b>	<b>Pasture</b>	<b>F.F.</b>	<b>1/2 grain</b>	<b>Pasture</b>
Wt. end of Phase 2, Lbs.	748	782	786	742	828	904	894	846
Avg. Daily Gain, Lbs.	2.80	3.56	3.49	2.76	2.28	3.21	3.13	2.19
TDN per lb. Gain, Lbs.	(1)	3.78	3.92	(1)	(1)	4.41	4.45	(1)
Cost per cwt. gain, \$ <sup>(2)</sup>	3.65	10.56	10.46	3.22	4.38	12.21	11.83	4.56
<b>Phase 3</b>								
<b>Treatment</b>	<b>F.F.</b>	<b>F.F.</b>	<b>F.F.</b>	<b>F.F.</b> <sup>(3)</sup>	<b>F.F.</b>	<b>F.F.</b>	<b>F.F.</b>	<b>F.F.</b>
Days on Phase 3	133	83	83	133	133	62	62	83
Wt. end Phase 3, Lbs.	1051	993	1006	1047	1119	1064	1048	1040
Avg. Daily Gain, Lbs.	2.31	2.68	2.78	2.32	2.09	3.04	2.92	2.46
TDN per lbs. Gain, Lbs. <sup>(1)</sup>	6.25	5.71	5.79	4.93	5.26	5.76	6.06	6.04
Cost per cwt. gain, \$ <sup>(2)</sup>	17.38	16.19	16.42	13.40	14.63	16.23	17.01	16.92
<p><sup>(1)</sup> Pasture energy not measured.</p> <p><sup>(2)</sup> Does not include pasture costs for lots 9, 12, 13, 16.</p> <p><sup>(3)</sup> Lots 12 and 13 fed grain on pasture for 27 days in Phase 3.</p>								

**SYSTEMS OF PRODUCING YEARLINGS (1968-69)**

**Table 6. Summary of Results Entire Experiment**

<b>Lots</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17__</b>
Days on Experiment	398	398	398	398	358	398	358	358
Initial Wt. Lbs.	417	413	417	416	416	415	416	416
Final Wt. Lbs.	1045	953	1051	1065	1001	1021	1063	1055
Avg. Daily Gain, Lbs.	1.58	1.36	1.59	1.63	1.64	1.52	1.81	1.79
TDN/lb. Gain, Lbs. <sup>(1)</sup>	4.8	4.4	6.5	6.1	4.5	4.5	5.9	6.0
Avg. Carcass Grade <sup>(2)</sup>	7.1	7.3	8.4	7.5	7.6	7.1	8.0	8.6
Dressing% <sup>(3)</sup>	57.0	56.8	58.9	58.5	56.4	58.8	56.7	58.2
Cost per cwt. Gain <sup>(4)</sup>	\$11.77	\$10.93	\$15.96	\$15.26	\$11.08	\$11.12	\$14.53	\$15.07
<sup>(1)</sup> Pasture energy not measured. <sup>(2)</sup> Does not include pasture costs for lots 9, 12, 13, 16. <sup>(3)</sup> Lots 12 and 13 fed grain on pasture for 27 days in Phase 3.								

**SYSTEMS OF PRODUCING YEARLINGS (1968-69)**

**Table 7. Summary of Results by Phases**

<b>Lots</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>
<b>Phase 1 – Wintering (197) Days</b>								
<b>Treatment</b>	<b>Low Level</b>				<b>Moderate Level</b>			
Initial Wt., Lbs.	417	413	417	416	416	415	416	416
Wt. end of Phase 1, Lbs.	541	525	538	548	643	644	633	628
Avg. Daily Gain, Lbs.	0.63	0.56	0.61	0.66	1.18	1.15	1.13	1.10
TDN per lb. Gain, Lbs.	6.2	6.8	7.4	6.8	6.4	6.3	6.6	6.8
Cost per cwt. gain, \$	13.66	15.54	17.12	15.64	14.76	14.64	15.39	15.83
<b>Phase 2 – Pasture or drylot (83 days)</b>								
<b>Treatment</b>	<b>Pasture</b>	<b>Pasture<sup>(1)</sup></b>	<b>DL 1/2 Gr.</b>	<b>F.F.</b>	<b>Pasture</b>	<b>Pasture<sup>(1)</sup></b>	<b>DL 1/2 Gr.</b>	<b>F.F.</b>
Wt. end of Phase 2, Lbs.	748	751	739	753	816	813	820	837
Avg. Daily Gain, Lbs.	2.59	2.72	2.43	2.47	2.08	2.05	2.25	2.52
TDN per lb. Gain, Lbs.	(2)	(2)	5.4	4.7	(2)	(2)	5.9	5.2
Cost per cwt. gain, \$	(1) 3.86	(1) 3.68	12.70	11.46	(1) 4.80	(1) 4.89	14.08	12.77
<b>Phase 3 - Finishing</b>								
<b>Treatment</b>	<b>- Full Feed -</b>							
Days on Phase 3	118 <sup>(3)</sup>	(50) (68)	118	118 <sup>(3)</sup>	(50) (68)	(78)	78	78
Wt. end of Phase 3, Lbs.	1045	953	1051	1065	1001	1021	1063	1055
Avg. Daily Gain, Lbs.	2.45	1.71	2.64	2.64	2.41	1.73	3.12	2.80
TDN per lb. Gain, Lbs.	6.5	6.2	6.0	5.9	6.5	6.3	5.4	6.1
Cost per cwt. gain, \$	15.70	15.23	14.81	14.60	15.72	15.54	13.06	15.03
<p>(1) Fed 6 lbs. barley and all silage they would eat.</p> <p>(2) Pasture energy not measured.</p> <p>(3) Lots 11 and 14 fed grain on pasture for 25 days in Phase 3.</p>								

**SYSTEMS OF PRODUCING YEARLING'S PROGRESS REPORT (1969-70)**

**Table 8. Moderate vs. High Level Wintering**

<b>Lots</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>
			<b>Phase 1 – 112 Days</b>			
<b>Treatment (Wintering)</b>	<b>Moderate</b>			<b>High</b>		
Initial Wt., Lbs.	519	516	516	514	517	516
Wt. end of Phase 1, Lbs.	662	691	663	769	764	760
Avg. Daily Gain, Lbs.	1.28	1.38	1.31	2.28	2.21	2.18
Cost per cwt. gain, \$	14.41	13.00	14.02	11.71	12.03	12.25
	<b>Phase 2 – 63 Days</b>					
<b>Treatment</b>	<b>Dry Lot Full Feed</b>	<b>Dry Lot 1/2 Grain</b>	<b>Pasture</b>	<b>Dry Lot Full Feed</b>	<b>Pasture</b>	<b>Dry Lot 1/2 Grain</b>
Wt. end of Phase 2, Lbs.	814	833	779	903	864	883
Avg. Daily Gain, Lbs.	2.40	2.26	1.84	2.12	1.59	1.95
Cost per cwt. gain, \$	14.28	13.20	(1)-----	17.63	(1)-----	15.97
	<b>Phase 3 – 77 Days</b>					
<b>Treatment</b>	<b>Full Feed</b>	<b>Full Feed</b>	<b>Full Feed</b>	<b>Full Feed</b>	<b>Full Feed</b>	<b>Full Feed</b>
Wt. end of Phase 3, Lbs.	1029	1066	999	1098	1075	1091
Avg. Daily Gain, Lbs.	2.77	2.98	2.82	2.50	2.70	2.67
Cost per cwt. gain, \$	14.38	13.59	12.99	16.62	14.24	15.45
<b>Total to Date (252 days)</b>						
Wt. end of 252 Days, Lbs.	1029	1066	999	1098	1075	1091
Avg. Daily Gain to Date, Lbs.	2.03	2.09	1.92	2.32	2.21	2.28
Cost per cwt. gain to Date, \$	14.36	13.31	<sup>(1)</sup> 10.19	14.70	<sup>(1)</sup> 10.71	14.21
Including 10¢/day for Pasture, \$			11.50		11.84	
<sup>(1)</sup> Pasture costs not included.						
<sup>(2)</sup> Lots 12 and 14 have not been sold or slaughtered.						



## Results

In the interpretation of the data some interesting trends show up. In both years the moderate level of wintering resulted in lower costs per pound of gain, 54% more efficient use of ration energy, and a lower “break-even” price than the low level of wintering. The “break-even” price includes the initial cost of calf at \$27.00/cwt. and cost of feed, but not any costs for labor, overhead, interest, etc. Thus in the wintering phase (Phase 1) the results show that only about 54% of the ration energy was used for maintenance of the steers on the moderate level of wintering, leaving 46% of the energy for growth and gain whereas in the low level, 66% of the energy was just to maintain the calves, leaving only 34% of the energy for gain. Thus, if the steers had been sold at the end of the wintering period for the same price per pound, those on the moderate level of wintering (1.12 to 1.28 lbs. per day) would have made more money, not only in terms of per hundred pounds of gain but also total per steer as compared to the low level (0.55 to 0.62 lbs. per day) wintering group.

The effect of the level of wintering on subsequent pasture gains is interesting. The performance of the steers showed those wintered at the moderate level gained only 80% as fast as those on the low level of wintering. However, even with the faster gains they made on pasture the calves wintered at the lower level were not able to adequately compensate or “catch-up” in the three month pasture period on the good brome-crested wheat pasture and weighed 60 to 80 pounds less at the end of this phase.

The four lots in dry lot did better in 1967-68 than those on pasture but in 1968-69 those on moderate-level wintering did slightly better on pasture than the corresponding lots in dry lot. However, in terms of economics the pasture lots were slightly ahead--particularly because pasture was charged at 10¢ per head per day. The feed costs per one hundred pounds of gain was cut almost in half because of the low pasture cost--less than \$5.00 per cwt. as compared to \$10.00 to \$14.00 in dry lot, therefore, if sold after the pasture period those on either wintering level would have made more money if sold than those fed in dry lot. This is another way of saying that pasture of the quality used was worth more than the 10¢ a day charged in comparison to the feeds used in dry lot and with the value and prices as quoted in (Table3).

In Phase 2 comparisons of the lots fed one half grain allowance and all the corn silage they would eat and those fed higher levels of grain showed some variation. In both experiments (Tables 5 & 7) those lots on more grain gained slightly better and were slightly more efficient in use of energy. The costs of gain were similar between these comparisons--slightly in favor of those steers receiving more grain. In comparing the effect of level of wintering to these dry lot treatments there was a tendency for those steers wintered at low-level to attempt to compensate by gaining faster but a look at the steer weights at the end of Phase 2 shows that they didn't catch-up. If the steers had been sold at the end of this period, those wintered at the moderate level would have made more money than would those wintered at the low level. In Phase 3 the finishing phase, the steers that were kept on pasture for a month or two longer and fed 1/2 allowance of barley had lower feed costs because these values do not include pasture charges. This may be misleading as seen by checking the overall performance (Lots 12 and 13 in Table 4 and Lots 11 and 15 in Table 5). Although the cost per cwt. gain was slightly less for these lots because pasture charges were not included, it would appear that this practice is of questionable benefit of extra labor necessary for hand-feeding. In this Phase 3 the gains and efficiency of energy use were in favor of the moderately wintered lot. With the exception of the lots fed grain on the longer pasture period all the lots wintered at the moderate level finished faster and more efficiently. Thus, the steers which were “pushed” rather than “carried” at lower levels of feeding seemed to gain faster and more efficiently in this phase with the effect of previous treatment opposite to what might be expected.

In comparing overall performance for both years (Tables 4 and 6) the gains, efficiencies, and costs of gain were all good, but the carcass grades and dressing percentages somewhat disappointing. The carcass grades and dressing percentages somewhat disappointing. The carcass grades are low mainly because of generally poor marbling. Average backfat thickness was reasonably good. The dressing percent should not be compared to other experiments because this measure was made only for comparisons between treatments of this experiment and was based on final weights at the Dickinson station and hot carcass weights at West Fargo a day or two later. In both years the steers on moderate level of wintering gained faster and more efficiently and would have been more profitable if sold at the end of any of the three phases as compared to those wintered at low level. Pasture reduced costs of gain but delayed finishing as reflected by the longer time necessary for fattening in Phase 3. However, as stated earlier, this system would be very useful where good pasture is available for 3 or possibly, 4 months. Certainly it would not pay to keep the steers on pasture after the growth of the grass was stopped and the grasses reached maturity. In general the steers put on full feed of grain after the wintering phase gained faster than those on the higher level of silage in Phase 2. However, the differences were not large enough to make this a clear-cut choice and the use of corn silage in dry lot in Phase 2 appears to be a good way to use feeds of this type.

Costs of labor, interest, overhead, etc. were not calculated but from feed costs per cwt. gain and break-even costs of less than \$20.00 per cwt. for all lots and all treatments for the entire experiment, each and every treatment or system would have made a profit in addition to marketing feeds at the prices quoted and the steers wintered at the moderate level had break-even costs which were lower than those wintered at the low level.

### **Progress Report (1969-70) Moderate vs. High Wintering**

Table 8 gives a progress summary of comparisons of moderate vs. high level of wintering. The previous research comparing low vs. moderate levels of wintering showed the moderate level to be superior in most respects. Thus it was necessary to check if high levels of wintering would be superior to moderate levels.

Since this experiment is still in progress, and only 4 of the six lots have been slaughtered, only a few comments can be made. The same prices were used as reported in Table 3 to facilitate comparisons.

The gains of almost 2.25 lbs. per day were high in terms of usual wintering gains and the costs per cwt. gain was less than it was for the steers wintered at a moderate level (Table 8). This again reflects the amount of energy left over for gain over and above the energy need for maintenance. At both levels of wintering the cost per pound of gain was reasonably good. Only 2 lots, one from each level of wintering, were put on pasture. The effect of winter gains on subsequent pasture gains cannot be fully evaluated on one year's data. Preliminary observations suggest that it is not feasible to use the high level of wintering if it is desired to make maximum use of pasture. The low charge of 10¢ per steer per day for pasture still reduced the total average cost per hundred pounds of gain by almost \$3.00 for those on the high level of wintering, and although the pasture lot from the moderate level have not been sold and slaughtered there was also a reduction in overall feed costs for that lot.

In Phase 2 – the results from this growing phase showed better gains for the steers wintered at the moderate level. Because the experiment isn't complete the effect on the overall gain and efficiency cannot be evaluated.

The greater gain of the three moderately wintered lots in Phase 3 shows the attempt to compensate or catch up. All the data, carcass data, fat cover, etc. will be necessary before it can be speculated that either level of wintering is better from the dollar and cents standpoint. Obviously the steers wintered on the high level gained faster for the 252 day experiment as compared to those wintered at the moderate level. Whether the overall efficiency and cost of gain will be in favor of the lots wintered on a high level is still unmeasured. In any event, at this stage of the experiment either method of wintering and any subsequent method of increasing gains shows excellent promise of increasing gross income in the production of yearlings using North Dakota calves and feeds generally available in North Dakota.