

ing of two year old heifers on high, moderate and low levels of winter feeding. Although 47 percent of the heifers required some degree of assistance at calving there was no association between calving difficulty and rebreeding performance.

The average calving dates of the second calf of heifers on the low and moderate levels were, respectively, 5 weeks and 3 weeks later than the average date for heifers on the high level. Approximately one half of this difference was due to later breeding as yearlings as evidenced by later calving at two years of age ($2\frac{1}{2}$ weeks and $1\frac{1}{2}$ weeks later for low and moderate respectively). The remainder of the delay in date of calving of the second calf is the result of a longer post-partum interval from calving to conception. The average intervals were: high, 74 days; moderate, 86 days; and low, 95 days.

These observations suggests adequate nutrition is just as critical in the lactating two-year-old as in the yearling heifer. Earliness of calving and promptness of rebreeding of two year old heifers depends, largely, on the level of nutrition provided during the critical wintering period.

The Cumulative Influence of Level of Wintering on the Lifetime Performance of Beef Females Through Five Calf Crops

S. A. Ewing, Larry Smithson, L. S. Pope and D. F. Stephens

The type of forage available to range beef cows in the winter months dictates that supplemental protein and often supplemental energy be provided to insure acceptable cow performance.

The amount of supplemental feed required is of great economic importance in terms of feed cost, reproductive performance and milk production of the dam.

Several experiments have been conducted at this station which relate to this subject and progress reports have been made periodically. This report summarizes performance of spring-calving cows wintered at different levels from weaning through five calf crops.

Experimental Procedure

One hundred twenty weaner heifer calves were selected from the Ft. Reno herd as experimental animals and started on test at an average age of approximately 8 months at weights of near 475 lbs. One-half of

the above number was started as weaner calves in the fall of 1957 and the balance started as weaner calves in the fall of 1958. The heifers were allotted to four groups of 30 each on the basis of sire, dam's productivity, age, grade and weight. The winter feeding program was started each year in early November and was terminated when green grass was ample in the spring around April 15.

The experimental treatments employed were designed to result in selected winter weight change patterns as follows:

Lot 1 (Low). No gain the first winter as calves, with a loss of approximately 20 percent of fall weight during subsequent winters as bred females.

Lot 2 (Moderate). Gain of 0.5 lb. per head daily the first winter as calves, with a loss of 10 percent of fall weight during subsequent winters as bred females.

Lot 3 (High). Gain 1.0 lb. per head daily during the first winter as calves, then less than a 10 percent weight loss from fall weight during the subsequent winters as bred females.

Lot 4 (Very High). Self-fed a 50 percent concentrate mixture during the first winter as calves and during subsequent winters as bred females.

The above treatments have been followed to date with the exception that one half of the females in Lot 4 were reverted to the moderate level the fourth winter to study the effects of a very high level the first three winters followed by the moderate level during subsequent winters. This group from Lot 4 was designated Lot 5 and will be referred to as such in this report.

The daily level of winter supplemental feed consisting of cottonseed cake or cottonseed cake and ground milo was adjusted periodically to produce, as nearly as possible, the weight change patterns outlined above. The low level females were confined to dry lot during the early part of each winter and fed wheat straw to initiate the desired weight loss. After this initial period they were maintained on native tall grass pastures during the winter.

The females in all other treatments were maintained on native tall grass pastures during the entire winter and fed the appropriate levels of supplemental feeds. All animals had free-choice access to a mineral mixture consisting of two parts salt and one part steamed bone meal throughout the year. All groups were grazed on native pasture during the summer months.

The heifers were exposed to bulls as yearlings and calved first as 2 year olds. Detailed records have been collected on weight change patterns, skeletal development, reproductive performance, birth and weaning weights of calves and milk production has been estimated periodically during the summer by a standard procedure which involves weighing the calf before and after nursing.

Results

The results will be presented and discussed under separate headings designated by the general types of observations involved.

Weight Change Patterns

The periodic weights observed during the study to date are shown in Table 1 and designated as fall and spring weights. The spring weights in each instance were taken in early April, therefore these weights after the heifers were two years of age reflected weight changes from fall to spring and include weight losses incident to calving and early lactation. The rate of development of the heifers can be followed for each treatment by observing the progressive weights for a given time each year.

Using the successive spring weights taken at the beginning of the grazing season to reflect the development patterns, the weights for the first three respective seasons were: Low level, 462-571-667 lbs.; moderate level, 569-679-829 lbs.; high level, 620-789-889 lbs. The weight change patterns for the very high groups for this same period can be seen in Table 1, however, the gains produced by this level are excessive and may actually have a depressing influence on milk production.

The low level appears to be sub-optimum during the first four winters of the cow's life. Beyond this point of maturity, however, this

Table 1. Weight Change Patterns of Beef Females Wintered at Different Levels

Lot No.		1	2	3	4	5
Wintering Level		Low	Moderate	High	Very High	Very ⁵ High to Fourth Winter, Then Moderate
	Calf Crop Number					
	Age in Months					
	7 Fall	473	472	475	488	457
	12 Spring	462	569	620	768	725
	18 Fall	783	829	859	892	892
1	24 Spring	571	679	789	1048	1095
	30 Fall	848	880	959	1084	1050
2	36 Spring	667	829	889	1182	1182
	42 Fall	968	1037	1066	1197	1171
3	48 Spring	807	934	991	1438	925
	54 Fall	1103	1137	1155	1328	1079
4	60 Spring	850	943	1025	1566	915
	66 Fall	1142	1186	1212	1430	1133
5	72 Spring	857	930	1043	1627	928
	78 Fall	1191	1240	1289	1480	1280

level has produced levels of productivity, expressed as pounds of calf weaned per cow, that are comparable to the moderate and high levels. A rate of development comparable to the moderate and high levels during the first four winters appears to be more desirable than either the low or very high levels practiced in this test.

The amounts of supplemental feed required for the various levels each winter are shown in Table 2. The supplemental feed provided the low level cows was fed typically from early January to mid-April. The other groups received supplemental feed from early November to mid-April each year.

Survival

The data in Table 3 indicates the number of cows remaining after five calf crops, the percentage remaining in the herd and the reasons for removal. Cows were culled from the herd on the basis of health or failure to conceive for the second successive year. From these data it appears that the cows on the high and very high levels are exhibiting lower survival rates than those on the low and moderate levels. With limited numbers of animals, however, strong conclusions at this point do not seem warranted.

Productivity

Productivity of the beef cow involves both percentage calf crop and weaning weight of the calves produced. Weaning weight, taken at a given time, is a reflection of birth date, milk production and the calves' ability to grow on the milk and other feeds consumed. Table 4 summarizes the long term performance of the cows in the different treatment groups. It is apparent that each higher level of wintering from low to high has tended to result in earlier calving dates by about one week. Levels above this do not appear to have improved this particular characteristic.

Table 2. Supplemental Feed Provided Per Cow For Each Level of Wintering During the Six Successive Wintering Periods

Treatment Winter	Low ¹		Moderate ²		High ²		VH ²	VHM ²
	CSC	Milo	CSC	Milo	CSC	Milo	Mixed Ration	Mixed Ration
1	52	39	275	259	389	732	3428	3428
2	59	36	310	136	356	640	4990	4990
3	55		238	81	396	753	5160	5160
								CSC Milo
4	38		225	29	389	643	6951	202 56
5	61		255	29	255	635	8254	249 --
6	80		258	34	242	569	6571	262 62

¹ Supplemental feeds provided during a period of approximately 100 days from early January.

² Supplemental feeds provided during a period of approximately 150 days from mid-November.

Table 3. Reasons for Removal of Beef Cows Wintered at Different Levels

Lot No.	1	2	3	4	5
Wintering Level	Low	Moderate	High	Very High	Very High to Fourth Winter Then Moderate
No. of Heifers started on test as weaner calves (1957-58)	30	30	30	15	15
No. of cows re-remaining — 1964	26	26	24	12	12
Percent of cows remaining	86.7	86.7	80.0	80.0	80.0
Cause for Removal:					
<i>Death</i>					
Calving Difficulty	1			2	
Impaction of Abomasum	1				
Brain Abscess		2			
Uterine infection		1			
Cause Unknown			2		
<i>Culled</i>					
Open 2 Successive Years	1		4		1
Hardware Disease		1			
Poor Condition	1				
Cancer Eye					1
Foundered					1
Uterine Prolapse				1	
<i>Total</i>	4	4	6	3	3

A graphic representation of the influence of level of wintering on calving dates for each calf crop is shown in Figure 1. The differences appear to be rather consistent for the low, moderate and high levels for all calf crops, however, the widest differences occur in the case of the second calf crop. The long term average birth weight for calves produced by the different groups does not vary widely. The greatest differences observed in birth weights were for the first calf produced by cows on the low level, which averaged about 10 lbs. less than calves produced by the other groups. After the first calf very slight differences appeared in birth weight among the various treatment groups.

The average weaning weights of calves for five calf crops (Table 4) increase progressively from the low to high level. Weaning weights of calves produced by heifers developed at the very high level is intermediate with respect to those observed for the other treatments. Figure 2 shows graphically the performance for all groups of cows in this regard with marked differences occurring in the first two calf crops. The difference narrows considerably beyond this point, however.

It is interesting to observe that the females developed at the low and moderate levels have improved steadily throughout the period.

Table 4. Performance of Cows Wintered at Different Levels Through Five Calf Crops

Lot No.	1 Low	2 Moderate	3 High	4 Very High	5 Very High to Fourth Winter Then Moderate
No. of heifers started on test (1957-1958)	30	30	30	15	15
No. of cows remaining in 1964	26	26	24	12	12
Average calving date (month/day)	3/17	3/9	3/2	3/4	3/3
Average birth wt., lbs.	73	76	79	73	76
Average weaning wt., lbs.					
All calves	404	449	471	437	441
Percent Calf crop weaned based on cows exposed	84.6	85.3	87.0	82.1	83.1
Total pounds of calf weaned per group, lbs. (sex corrected)	47757	56516	55161	24688	26824
Total pounds of calf weaned lots 4&5, combined, lbs. (sex corrected)					51512
Ave. milk production, (lbs. daily)	10.01	11.48	12.17	10.11	9.52
Total supplement cost For the six wintering Periods. (\$ per cow)	15.30	73.83	160.52	671.72	288.86

Correspondingly, the curve for the females developed at the very high level has tended to turn down at the 5th calf. This may suggest that the cows developed at the very high level are physiologically older and the down turn normally expected to occur at 8-9 years of age is occurring at an earlier chronological age. Subsequent calf crops will provide additional information on this point. The performance of cows developed at the very high level (Lot 5) then switched to a moderate level the 4th winter are combined with Lot 4 in this graph since the same trend is noted for both groups.

It is also of interest to note that the females developed at the very high level produced calf weights as high in the case of the second calf as was noted for the same heifers for the 3rd and 4th calf, while all other females exhibited a rather steady improvement in weaning weight to the 4th calf. This may suggest that age of dam correction factors that are commonly used in selection programs may or may not be correct depending on the level of heifer development practiced.

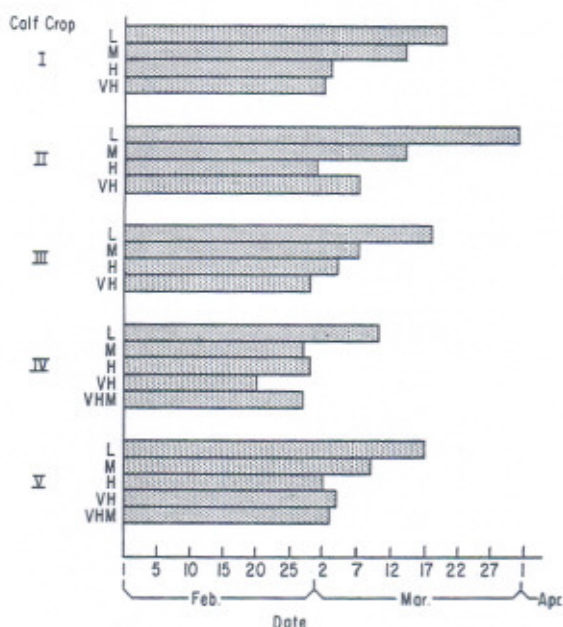


Figure 1. Influence of level of wintering on average birth date for successive calf crops.

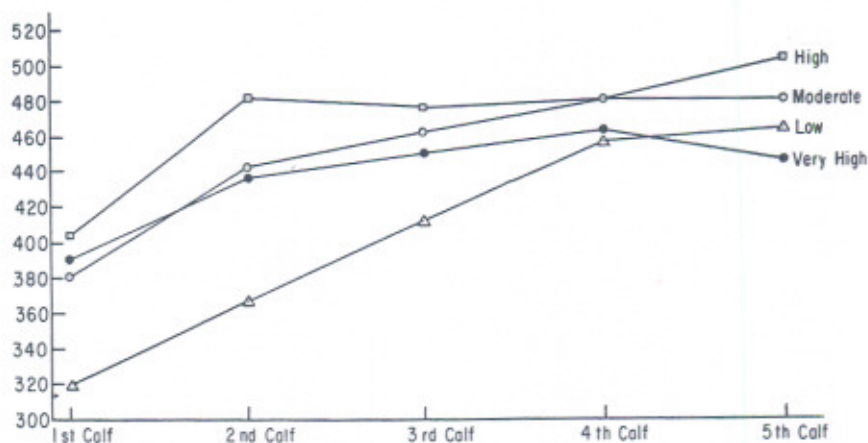


Figure 2. Average weaning weights of successive calf crops produced by cows wintered at different levels.

Figure 3 depicts the percentage calf crop observed for each of the five calf crops and Figure 4 shows the pounds of calf weaned per cow remaining in the herd at a given breeding season. This reflects both percentage calf crop and weaning weight of the calves produced. From this the low level has a most pronounced depressing influence through the first three calf crops after which time performance is comparable to the moderate and high levels. The higher productivity associated with the high level as compared with the moderate appears to diminish at a consistent rate through the first 4 calf crops, however, differences observed after the third calf are small.

The cost of supplementation for the various groups is also shown in Figure 4. Since the value of weaned weight is highly variable no attempt has been made to outline the single most profitable program, however, the feed costs reported or those that might be assigned by a producer and the comparative weaning weight and value per cow might be used to assess the value returned for increasing investments in feed. On this basis it would appear that returns for supplemental feed are most likely to favor the moderate level over the low level during the winters preceeding the second and third calf crops. It seems less likely that the increased supplement cost for the higher level will be offset by increased productivity unless the price of calves is extremely high relative to feed costs.

Summary

The influence of level of wintering on the performance of beef females through the first five calf crops is reported. The most marked sustained influence of the low level of wintering appears to be reflected in rebreeding performance as measured by average calving date. The weight change pattern exhibited by the moderate level appears to be consistent with both productivity and economy of wintering. The weight change characteristic of this level was a gain of 97 lbs. the first winter as weaner calves with subsequent winter weight losses of approximately 10-15 percent from fall weight including calving loss. Differences in

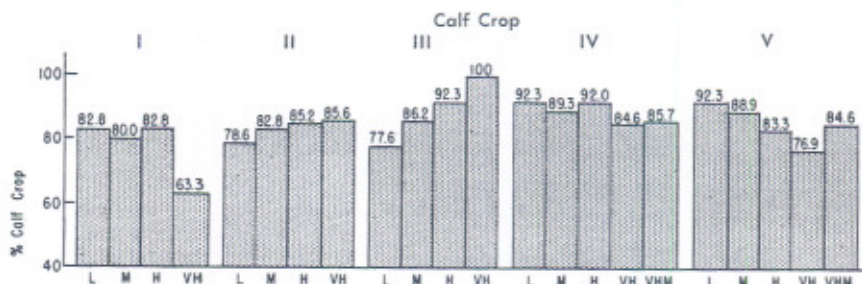


Figure 3. Influence of level of wintering on percentage calf crop weaned, based on cows exposed to bulls.

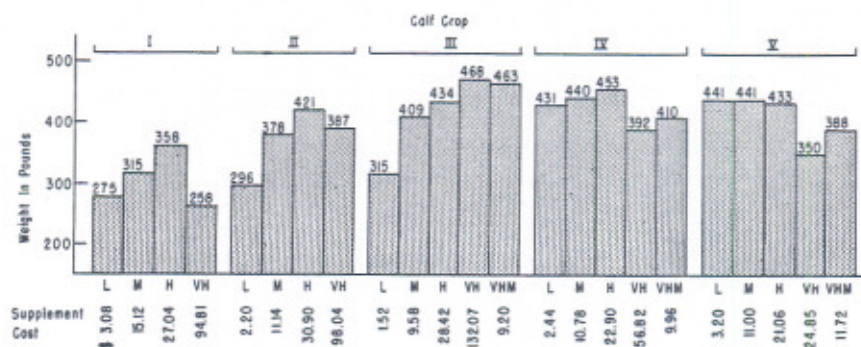


Figure 4. Influence of level of wintering on pounds of calf weaned per cow and supplemental feed cost prior to each calf crop.

cow survival resulting from level of wintering are not conclusive at this point. Development and maintenance of the beef females at very high levels reduced productivity below that observed for the moderate and high levels used in this study. Evidence also exists that this level of feeding may depress milk production below the more moderate levels. The results obtained by switching cows from a very high to moderate level indicates that the damage to productivity occurs early in life and is not corrected by lower levels after the third winter.

The data presented for the individual yearly calf crops indicate that rather than select a level of wintering for the life time of the cow, consideration should be given to the life cycle feeding approach in which higher levels are used during growth and development of the female followed by lower levels after the cow has reached maturity since the major influence of the various levels on cow productivity occurs during the first three calf crops.