supply was not associated with appreciable differences in carcass composition. The twins were slightly fatter and had less bone.

The growthier blackfaced rams sired lambs that grew faster after weaning and produced carcasses with more lean and bone than the lambs from the whitefaced rams. Since the carcass composition values used were percentages, the blackfaced lambs with more bone and lean automatically had less fat than the whiteface lambs.

A study of the association of measures of growth with carcass components (fat, lean, and bone) indicated low associations generally. Lambs that were heavier at birth had less fat and more lean and bone in the carcass when slaughtered than lambs with lighter birth weight.

The lambs that gained faster from birth to 10 weeks (those that got more milk and for other reasons) had less fat and more bone than slower gaining lambs. The lambs that gained faster from 10 weeks of age to slaughter weight tended to have less fat, more lean and more bone than the slower gaining lambs but the associations were all low.

Percent fat in the carcass was best estimated by wholesale cut fat trim, loin fat trim or specific gravity of the hind saddle. The same measures were the best predictors of percent lean. Percent bone was best predicted by the weight of the cannon bones. None of the measures were good enough as predictors to be classed as excellent but they were all substantially better than some that are traditionally used such as loin eye area, fat thickness at the 12th rib or wholesale cuts as a percent of the live weight.

The study is continuing and it is hoped that better measures or better combinations of measures will be found. Preliminary work with combinations of some of these measures show real promise of improved predictability.

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

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

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

The amount of supplemental feed required is of economic importance in terms of feed cost as well as the ultimate influence on 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 six calf crops.

Experimental Procedure

One hundred twenty weaner heifer calves were selected from the Ft. Reno herd as experimental animals and started on tests 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 lbs. 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 lbs. per head daily during the first winter as calves, then less than 10 percent loss of 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.

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 as 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 with supplemental feeds as necessary to produce the desired weight change.

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 which was estimated periodically during the lactation period 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 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 reveals the number of cows remaining after six calf crops, the percentage remaining in the herd and the reasons

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 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	738	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
6	84 Spring	874	981	1132	1374	976
	90 Fall	1146	1182	1262	1372	1172

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

Treatment	Low[1]		Moderate[2]		High[2]		VH[2]	VHM[2]	
Winter	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	6154	249	—
6	80		258	34	242	569	6371	262	62
							CSC	Milo	
7	61		236	—	291	699	224	672[3]	252	—

[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.
[3] The cows on the very high level received 867 lb. of mixed ration during the first month of the seventh winter.

for removal. Cows were culled from the herd on the basis of health or failure to conceive for two successive years. Percentage of cows remaining in the herd suggests 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

Table 3. Reasons for Removal of Beef Cows Wintered at Different Levels Through Six Calf Crops.

Lot No.	1	2	3	4	5
Winter 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 remaining	25	26	24	11	12
Percent of cows remaining—	83.4	86.7	80.0	73.3	80.0
Cause for Removal:					
Death					
Calving Difficulty	1			3	
Impaction of Abomasum	1				
Brain Abcess		2			
Uterine Infection		1			
Cause Unknown	1		2		
Culled					
Open 2 Successive Years	1		4		1
Hardware Disease		1			
Poor Condition	1				
Cancer Eye					1
Foundered					1
Uterine Prolapse				1	
Total	5	4	6	4	3

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. The very high level does not appear to have improved this particular characteristic.

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 the first four calf crops, however, the widest differences occur in the case of the second calf crop. Level of winter feed appeared to have no consistent effect upon calving date after the fourth calf crop. The long term average birth weight of 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 six 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 are intermediate with respect to those observed for the low and moderate treatments. Figure 2 shows graphically the performance for all groups of cows in this regard with marked difference occurring in the first two

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

Lot No.	1 Low	2 Moderate	3 High	4 Very High	5 VHM
No. of heifers started on test (1957-59)	30	30	30	15	15
No. of cow remaining after six calf crops	25	26	24	11	12
Average calving date (month/day)	3/16	3/9	3/2	3/4	3/4
Average birth wt., lbs.	74	77	79	74	77
Percent calf crop weaned per cow bred	86.3	87.0	86.4	81.0	83.3
Total lbs. calf weaned					
Non-corrected	57,765	66,675	64,145	28,280	31,060
Sex corrected	59,257	68,761	65,837	29,096	32,000
Age & sex corrected	60,171	67,601	64,077	28,497	31,436
Average lbs. of calf weaned					
Non-corrected	416	454	479	442	444
Sex corrected	426	468	491	455	458
Age & Sex corrected	433	460	478	445	449
Average milk production (lbs. daily)	10.4	12.0	12.2	10.3	10.3
Total supplement cost for the seven wintering periods ($ per cow)	17.74	83.24	186.14	710.59	298.94

calf crops. However, the difference narrows considerably beyond this point. It is interesting to observe that the females developed at the low and moderate levels have improved steadily throughout the period. However, heifers developed at the high and very high levels appear to reach a peak in pounds of calf weaned at the second calf crop and more or less maintain this level.

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 3 depicts the percentage calf crop observed for each of the six 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.

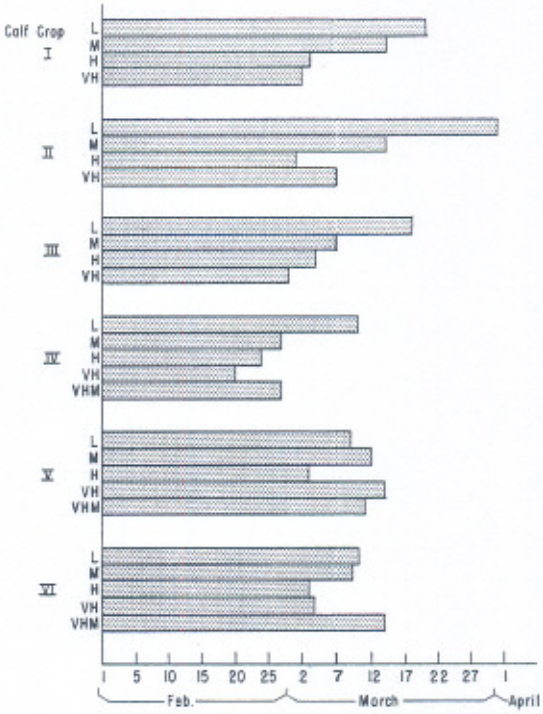

Figure 1. Influence of level of wintering on average birth date for successive calf crops.

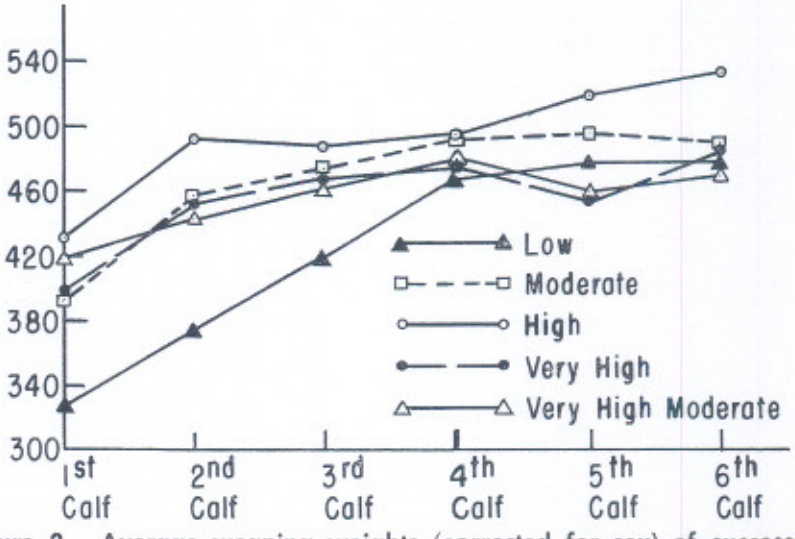

Figure 2. Average weaning weights (corrected for sex) of successive calf crops produced by cows wintered at different levels.

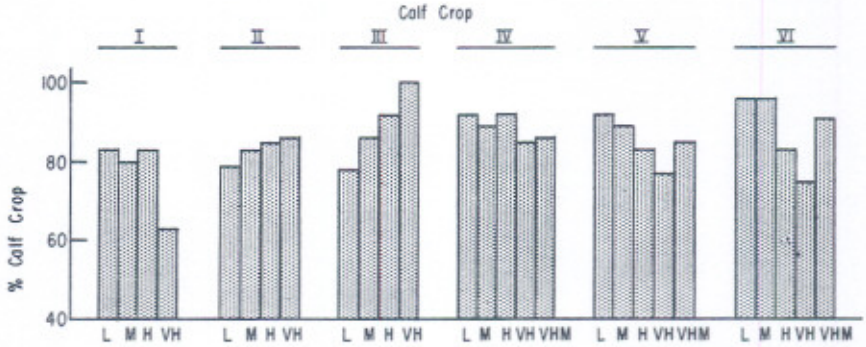

Figure 3. Influence of level of wintering on percentage calf crop weaned, based on cows exposed to bulls.

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 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 six 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 cow survival resulting from level of wintering are not conclusive at this point but the trend favors the moderate level. Development and maintenance of the beef females at a very high level reduced productivity below that observed for the more moderate levels. The results obtained by switching cows from a very high to moderate level indicates that the

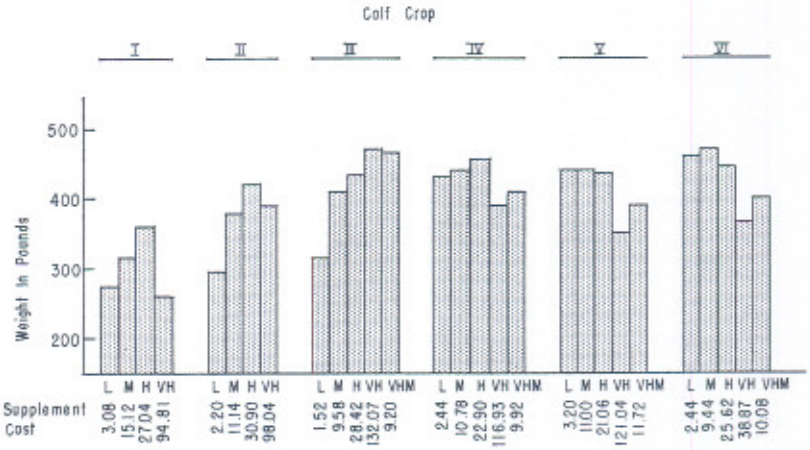

Figure 4. Influence of level of wintering on pounds of calf weaned per cow and supplemental feed cost prior to each calf crop.

damage to milk producing ability occurs early in life and is not corrected by lower levels after the third winter. Percentage calf crop was, however, improved by this treatment.

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.

A Study of Some Factors Affecting Feed Intake and Performance of Finishing Steers

Joe Hughes, S. A. Ewing and L. S. Pope

High concentrate rations have been accepted by many Southwestern feeders as a suitable feeding program for finishing cattle. Associated with feeding a high concentrate ration is a characteristic reduction in total feed intake and in some cases a reduction in calculated caloric intake when compared with conventional rations. Since capacity of the