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Optimum Feeding Rates for Wintering Weaner Calves

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Contents

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Review of Literature

The relationship between winter and summer gains in young cattle has received considerable attention for quite some time. Experiments from various parts of the country are in general agreement that pasture gains made by yearling cattle are negatively correlated with their previous winter gain (Kincaid, *et al.*, 1945; Mott, 1946; Marion, *et al.*, 1956; and Heineman, *et al.*, 1956). In summary, these reports indicated that summer gains were reduced from 0.2 to 0.6 pounds for every pound of winter gain.

A consideration of the influence which winter gain has on total gain (gain accumulated during both the winter feeding period and the summer grazing period) is probably of greater concern to most cattlemen. Controversy has been associated with data which have been presented on this relationship.

Weber, *et al.* (1947) and Lohrding, *et al.* (1959) found that poor winter gains were compensated for by faster pasture gains, and as a consequence total gains were essentially the same regardless of high or low winter gains. Ruby, *et al.* (1948), Miller and Morrison (1953), and Embry, *et al.* (1958) reported that increased winter gains resulted in increased total gains despite a negative correlation between winter and summer gains. Baird, *et. al.* (1958) summarized two experiments in which gains made over rather wide ranges during a 50- to 56-day feeding period had no influence on subsequent gains made during a 5-month grazing period. In both cases the additional pounds of gain accumulated during the feeding period were maintained throughout the pasture season.

There also appears to be some difference of opinion as to whether or not calves should be fed for continuous growth. Guilbert, *et al.* (1944), Johnson (1952), and Morrison (1956) have presented data which favored a more liberal feeding program for weaned calves in order that a continuous growth pattern be maintained. In contrast to these data, studies by Bohman and Torell (1956) along with those by Winchester and Ellis (1956) and Winchester and Howe (1955) indicated that young cattle placed on restricted rations were not permanently stunted, and once adequate feed was available to such animals their rate and efficiency of gain surpassed that of non-restricted animals by quite a marked degree.

The value of supplementing poor quality hay with protein and energy supplements has been clearly established. In earlier work reported by Rochford (1931) and Brouse (1944) and in a later study reported by Hubbert, *et al.* (1958), supplementing low quality hay with a protein supplement brought about tremendous increases in rate and economy of winter gains in weaner calves. The advantage of including an energy supplement with a meadow hay wintering ration was pointed out in a study reported by Wallace and Raleigh (1960).

When seasonal gain relationships, various feed costs, and cattle prices are all taken into account, there is little information available on the most profitable rate of winter feeding for weaned calves.

Objectives of this study were:

(1) To determine the influence of rate of winter gain of weaned calves on their gains made on grass the following summer.

(2) To determine the most profitable wintering level for weaned calves that are to be marketed as long yearlings at the end of the summer grazing period.

Methods and Procedure

Experimental data used in this study were taken from records compiled at the Squaw Butte Experiment Station located in southeastern Oregon, near Burns. In general, this locality is quite similar to rather large areas in the other western states where ranchers rely on native flood meadows for winter hay supplies and sagebrush-bunchgrass ranges for summer grazing.

Native flood meadows are usually found on alluvial plains or ancient lake beds surrounded by higher watershed areas. The vegetation consists primarily of rush and sedge, with some water-tolerant grasses and native clover. Generally the soils are saturated in the spring and early summer and become quite dry in the fall. It is estimated that there is a total of over 3 million acres of native flood meadow land in the 11 western states. Sagebrush-bunchgrass range is found in a climatic zone in which precipitation varies from about

8 to 12 inches annually and occurs primarily in the winter and spring. Range grasses in these areas begin growth in late April and are mature by early July. The total acreage of sagebrush-bunchgrass area in the west is approximately 90 million acres.

Conditions under which this study was conducted undoubtedly differ quite widely from similar studies reported from midwestern, southern, and eastern states. Most obvious among these differences would be the lengths of winter feeding and summer grazing periods and the quality of winter feed and/or summer pasture.

Winter and summer gains of 184 weaned Hereford heifers were used in this study. The gain data were collected over a seven-year period beginning during the fall of 1951 and terminating at the end of the grazing season of 1958. The animals were all produced in the herd of commercial Hereford cattle maintained by the Squaw Butte Station. Initial weights of the heifers at the beginning of the winter feeding period averaged about 400 pounds with some animals weighing as little as 270 pounds and a few weighing slightly over 500 pounds.

During the winter feeding period experimental animals were individually fed rations consisting of varying amounts of mountain meadow hay, barley, and cottonseed meal; therefore, a considerable range in daily gain was obtained. Feed consumption records were maintained on all test animals during the wintering period. The meadow hay fed was grown on the native flood meadows of the Squaw Butte Station and consisted primarily of rush (*Juncus* spp.) and sedge (*Carex* spp.) with minor amounts of grass and clover. The hay contained 6.5 to 8.0 percent crude protein. The length of the winter feeding period ranged from 108 to 149 days during the seven years.

The test animals were moved to sagebrush-bunchgrass range in late April each year where they grazed together in 2,200-acre fenced ranges typical of southeastern Oregon. The experimental summer grazing period varied from 81 to 103 days and was terminated on approximately August 1 each year to minimize yearly variation in grazing conditions and length of grazing periods.

All weights obtained on the experimental animals during the winter and summer periods were taken after the animals had been off feed and water for 12 hours.

Data available on winter gain, summer gain, and winter feed consumption made it possible to estimate costs and returns needed to analyze the economic aspects related to establishing more profitable wintering rates under various conditions.

Results and Discussion

Winter-summer gain relationships

A statistical analysis was made of the factors that affect average daily summer gain. The following equation was fitted to the data:

$Y = b_o + b_1 G_w + b_2 G_w^2$
$+ b_3 W_i + b_4 D_w G_w$ where:

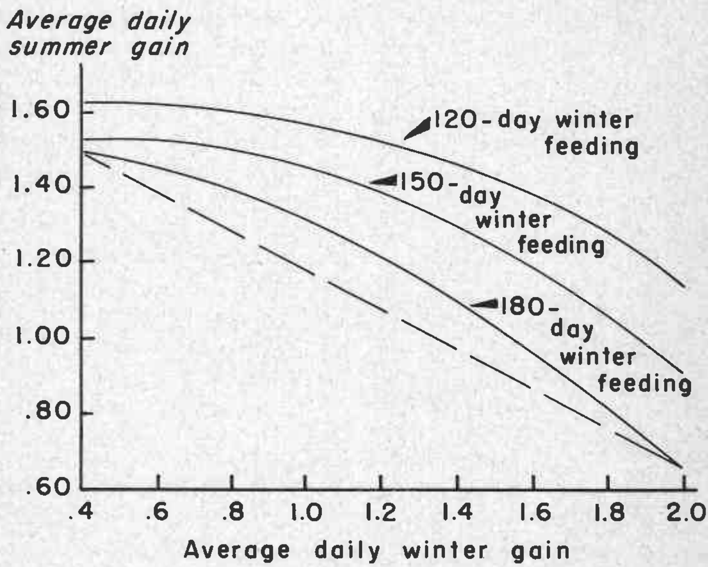
$Y =$ average daily summer gain
$G_w =$ average daily winter gain
$W_i =$ initial weight
$D_w =$ days on winter feed
$b_0, b_1, b_2, b_3, b_4 =$ constants derived from experimental data.

The equation gave the following results:

$Y = 1.6467 + .7467G_w - .2096G_w^2 - .0002W_i - .0043D_wG_w$
$R^2 = .9527$

b_0, b_1, and b_4 were significant at the 5 percent level. The b's in the equation are constants. They show the effect of the independent variables (average daily winter gain, initial weight, etc.) on the dependent variable (average daily summer gain). For example, the equation shows a slight inverse effect of initial weight on average

FIGURE 1. Daily winter and summer gain relationships.[1]



[1] 350 pound initial weight at beginning of winter feeding period; 90-day summer grazing period.

daily summer gain. This is indicated by the low value of b_3 (.0002) and the negative sign.

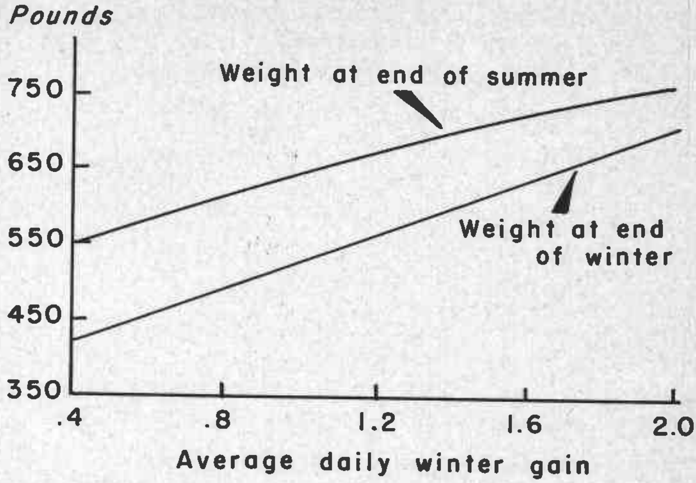
The equation states that average daily summer gain was related to average daily winter gain, weight at the beginning of the winter feeding period, and days on winter feed. The results of the analysis indicated that the heavier the animal at the beginning of the winter feeding period, the lower were the gains during the subsequent summer. However, this relationship was not a strong one. It appears that a considerable range in initial weight could exist before there would be any significant effect on summer gains. The analysis indicated that days on winter feed together with the rate of gain during the winter had a significant effect on gain during the subsequent summer. This relationship is shown more clearly in Figure 1.

The upper curve in Figure 1 shows the relationship between average daily winter gain and average daily summer gain, under the assumption of a 120-day winter feeding period with a 350 pound initial calf weight and a 90-day summer grazing period. With the 120-day winter feeding period, average daily summer gains showed no decline until average daily winter gains exceeded .6 pounds per day. The decline was then slight until 1.2 average daily winter gains were exceeded.

When a 150-day winter feeding period was considered with animals that had the same initial weight and summer grazing period, the relationship was changed somewhat. Average daily summer gains declined from the outset although the decline was not marked until one pound per day of winter gain was exceeded. A 180-day winter feeding period is perhaps more realistic for much of the high desert area of the Northwest than either the 120- or 150-day period. Here, the inverse relationship of winter and summer gains was considerably more evident. Even so, the relationship was significantly different from a linear regression which is illustrated by comparing the lower line in Figure 1 which is a straight line with the curve representing the 180-day winter feeding period. In the subsequent analysis the winter feeding period was assumed to be 180 days with 90 days of summer grazing. These are realistic periods for the ranching conditions to which this analysis will apply although many ranchers have longer summer grazing periods and consequently shorter winter feeding periods.

Even with the 180-day winter feeding period, the decline in rate of summer gain was more than offset by the greater total winter gain as illustrated in Figure 2. Weight at the end of the summer increased with the average daily winter gain. The increase in weight at the end of the summer was not proportionate, however, to the increase in average daily winter gain. This is illustrated by the tend-

FIGURE 2. Average daily winter gain and weight at end of winter and end of summer.[1]



[1] 350 pound initial weight, 180-day winter feeding period, and 90 days summer grazing.

ency of the two lines to come closer together as rate of winter gain becomes higher. These results indicate quite clearly that under the conditions analyzed in this experiment, the test animals were not able to compensate for limited gains made over a rather long winter feeding period during a relatively short summer grazing period. Another study reported by Wallace (1960) supports these findings.

Table 1. Mean Winter Weight, Average Daily TDN Required for Maintenance, Gain, and Total Consumption at Different Rates of Winter Gain[1]

Average daily winter gain	Mean winter weight	Average daily TDN required for Maintenance	Gain	Total consumption
lb.	*lb.*	*lb.*	*lb.*	*lb.*
.4	386	3.75	0.84	4.59
.6	404	3.88	1.26	5.14
.8	422	4.01	1.68	5.69
1.0	440	4.14	2.10	6.24
1.2	458	4.27	2.53	6.80
1.4	476	4.39	2.95	7.34
1.6	494	4.52	3.37	7.89
1.8	512	4.64	3.79	8.43
2.0	530	4.76	4.21	8.97

[1] Based on a 180-day wintering period and 350 pound initial weight.

Such items as age of animals, their genetic gaining ability, the quantity and/or quality of range or pasture, and the length of grazing period may also influence gains on summer pasture. It was not possible to measure all of these variables from the available data.

Average daily winter gain and TDN requirements

From the experimental data it was possible to estimate TDN requirements for various rates of gain.[1] The TDN requirements are shown in Table 1 for both maintenance and gain.

In Figure 3, TDN requirements per 100 pounds of winter gain and TDN requirements during the winter feeding period per 100 pounds of gain accumulated during both the winter and summer periods are shown. The requirements per 100 pounds of winter gain declined as rate of winter gain increased. When both winter and summer gains were considered, the requirements were at a minimum at 1.2 pounds of daily winter gain. On a TDN per 100 pounds of total gain basis, the increased efficiency resulting from heavier rates of gain during the winter was offset by declining summer gains when winter gains exceeded 1.2 pounds daily. Although 1.2 pounds daily winter gain has significance in terms of physical efficiency, it is not necessarily the most economic rate for which to feed. Costs and returns must be considered in order to make profitability determinations.

Ration composition, winter gain, and feed costs

The daily ration constituents used for different rates of winter gain were compiled from individual feed records. Modifications were made in a few instances in order to render the data more useful for estimating costs of winter gains. These data are presented in Table 2.

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[1] The following equation was used:

$\hat{Y} = b_1 W^{\frac{3}{4}} + b_2 \Delta G$ where:

Y = TDN requirements

W = average weight during winter feeding period

ΔG = average daily winter gain

The following results were obtained:

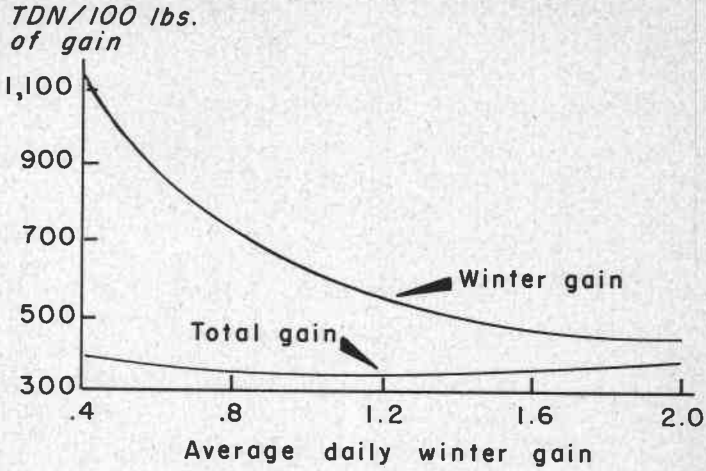
$\hat{Y} = .0431 W^{\frac{3}{4}} + 2.1054 \Delta G$

$R^2 = .7628$

b_1 and b_2 were significant at the one percent level.

The form of this equation was suggested and the coefficients were derived by Roger Petersen, Agricultural Statistician, Oregon Agricultural Experiment Station.

FIGURE 3. TDN requirements per 100 pounds of winter gain and per 100 pounds total gain at different rates of winter gain.[1]



[1] 350 pound initial weight, 180-day winter feeding period, and 90 days summer grazing.

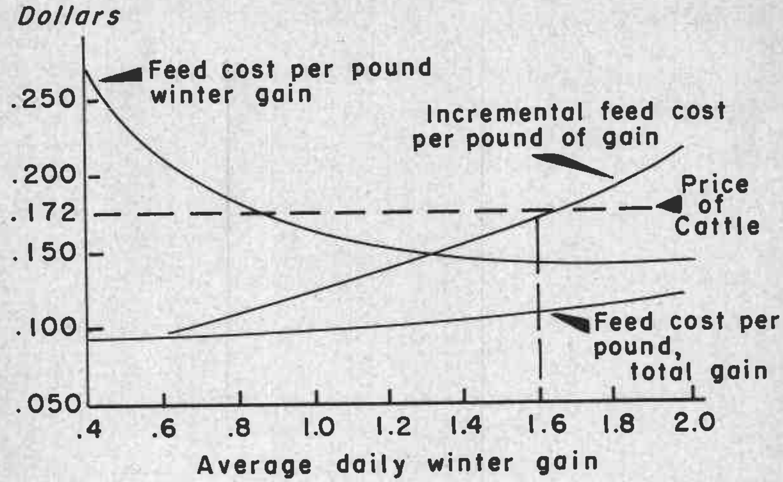
Table 2. Total Winter Gain, and Average Daily Ration Composition used at Different Rates of Winter Gain

Average daily winter gain	Total winter gain[1]	Average daily ration composition		
		Cottonseed meal	Barley	Meadow hay
lb.	*lb.*	*lb.*	*lb.*	*lb.*
.4	72	.5	.4	7.9
.6	108	.5	1.0	8.1
.8	144	.5	1.7	8.3
1.0	180	.5	2.5	8.2
1.2	216	.5	3.4	8.1
1.4	252	.5	4.4	7.8
1.6	288	.5	5.5	7.3
1.8	324	.5	6.7	6.7
2.0	360	.5	8.0	6.0

[1] 180-day feeding period.

One-half pound of cottonseed meal was fed at all rates of gain. The consumption of barley increased from 0.4 to 8.0 pounds per day as average daily gain increased from 0.4 to 2.0 pounds. Hay consumption increased as average daily gain increased up to 0.8 pound per day. Beyond this point hay consumption declined as additional barley replaced it.

FIGURE 4. Winter feed cost per pound of winter gain, winter feed cost per pound of total gain, winter feed cost per pound of incremental gain at different rates of winter gain.[1]



[1] 350 pound initial weight, 180-day winter feeding period, and 90 days summer grazing. Barley, hay, and cottonseed meal priced at $50, $20, and $80 per ton, respectively. Cattle prices assumed at .172 cents per pound.

Figure 4 is presented to illustrate the effect of rate of gain on cost of gain. Cost of summer grazing is not included in cost of gain because this cost will not change with different rates of winter feeding. As a result winter feeding decisions would not be affected by the cost of summer grazing. Omitting these costs simplified the analysis but did not affect the accuracy of the results. Feed cost per 100 pounds of winter gain declined throughout the range of winter gain. Feed costs per 100 pounds of total gain (winter and summer) increased as average daily winter gain increased. The cost of obtaining an incremental pound of gain also increased throughout the range of winter gain. This incremental cost is crucial in determining the most economic rate at which to feed. The most profitable rate of feeding is not necessarily where the cost per pound of gain is the least. In order to determine the most profitable rate, the price of cattle must also be considered. For example, with cattle at .172 cents per pound a daily winter gain of 1.6 pounds per day would give the greatest return above feed costs with the feed prices assumed.

Costs and returns

In order to provide winter feeding guides under various price-cost relationships, a variety of price assumptions were made with respect to both feed and cattle. More specifically, the assumptions were:

Hay (dollars per ton)	15 and 20.
Grain, barley (dollars per ton)	35, 40, 50, 60, 70.
Cattle (dollars per 100 pounds)	16, 20, 24, 28, 32.

Cottonseed meal prices were held constant at $80 per ton. The above feed cost and cattle price assumptions made it possible to calculate 50 different price and cost combinations. The results are given in Tables 3-7 on pages 15-19. The tables were prepared on the assumption of a 180-day winter feeding period and 90-days of summer grazing. This might mean a winter feeding period from November 1 to May 1 with summer grazing from May 1 to August 1. Under conditions imposed in this study summer gains usually take a sharp decline after about August 1. In many cases this can be a more profitable time to market animals than later in the fall.

When interpreting the tables certain limitations need to be kept in mind. Perhaps the most serious limitation is the assumption of constant cattle prices for all weights at the end of the summer grazing period. It is known that feeders tend to discriminate against cattle that are too heavy at the end of the summer. At what weight they begin to discount heavier cattle and the amount of the discount cannot be determined from available price statistics. Perhaps 700 pounds might be used as a breaking point. At weights heavier than this a price discount might be expected. This means that if calves at the beginning of the winter feeding period weigh 350 pounds or more, the average daily winter gain should not exceed 1.4 to 1.6 pounds if the 700 pound weight is not to be exceeded.

Some price and cost combinations are more probable than others. The most profitable rate of winter gain with hay at $20 per ton is given below for probable cattle and barley price relationships.

Cattle Prices	Barley Prices $50	$60	$70
$20	1.8	1.4	1.2
$24	2.0	1.8	1.4

Even with high barley prices and moderate prices for cattle, the most profitable rate of winter gain would be 1.2 pounds per day.

A cattleman wintering calves does not know, of course, what the price will be at the end of the following summer. Under these circumstances, a conservative policy has much to recommend it. Such a conservative policy would be to feed for a 1.6 to 1.8 pound per day winter gain when feed cost-cattle price relationships are likely to be favorable. Feeding for a gain of 1.2 to 1.4 pounds per day would appear reasonable when unfavorable relationships are likely.

The results of the above analysis raise questions which should be studied further. For example, should cattle be turned on the range as yearlings or should they be fed directly for market? Should the rancher with a cow herd have a cow-calf or a cow-yearling operation? It is possible that the most economic use of public rangeland is for cows and calves. Such questions deserve further study.

Summary

Experimental data including winter gains, summer gains, and winter feed consumption on 184 calves over a 7-year period were analyzed. Equations were fitted to the data to show the relationship between the factors studied. This made it possible to estimate the more profitable wintering levels under varying conditions.

Rate of winter gain together with number of days on winter feed had a significant negative effect on subsequent summer gain. Under conditions studied in this experiment, the inverse relationship between winter and summer gain deviated significantly from a linear regression. Calves restricted to limited winter gains were considerably lighter at the end of the summer grazing period.

Daily ration constituents and TDN values required for various rates of winter gain are presented. The TDN values required were divided into the portion required for maintenance and the portion available for gain.

TDN required during the winter per 100 pounds of gain accumulated during both the winter and summer periods reached the minimum when animals gained 1.2 pounds per day during the winter.

Winter feed costs per 100 pounds of winter gain and per 100 pounds of total gain (winter plus summer) were calculated at different rates of winter gain. The cost of obtaining an incremental pound of gain at these wintering levels was also determined.

When both costs and returns were taken into account and an assumed cattle price of $17.20 per hundredweight was used, the greatest return over feed costs occurred at 1.6 pounds of daily winter gain.

Using various assumed feed costs as well as cattle prices, 50 different cost-return combinations were calculated. These data indicated that a conservative recommendation would be to feed for winter gains of 1.6 to 1.8 pounds per day when feed cost-cattle price relationships appear favorable. Feeding for a gain of 1.2 to 1.4 pounds per day when unfavorable relationships are likely also seems reasonable under the conditions analyzed in this experiment.

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Table 3. Returns per Head Above Winter Feed Costs with Hay at $20 and $24 per ton, Barley $70 per ton, Cottonseed Meal $80 per ton, and Varying Cattle Prices[1]

Daily rate of winter gain	Hay $20 per ton					Hay $24 per ton				
	Cattle prices per 100 lbs.					Cattle prices per 100 lbs.				
	$16.00	$20.00	$24.00	$28.00	$32.00	$16.00	$20.00	$24.00	$28.00	$32.00
.4	$68.96	$91.28	$113.60	$135.92	$158.24	$66.12	$88.44	$110.76	$133.08	$155.40
.6	69.84	93.44	117.04	140.64	164.24	[67.11]	90.51	114.11	137.71	161.31
.8	[70.01]	94.81	119.61	144.41	169.21	67.03	91.83	116.63	141.43	166.23
1.0	69.65	95.61	121.57	147.53	173.49	66.68	92.64	118.60	144.56	170.52
1.2	68.58	[95.62]	122.66	149.70	176.74	65.67	[92.71]	119.75	146.79	173.83
1.4	66.85	94.89	[122.93]	150.97	179.01	64.05	92.09	[120.13]	148.17	176.21
1.6	64.57	93.57	122.57	[151.57]	180.57	61.93	90.93	119.93	148.93	177.93
1.8	61.75	91.67	121.59	151.51	[181.43]	59.33	89.25	119.17	[149.09]	179.01
2.0	58.25	89.01	119.77	150.53	181.29	56.09	86.85	117.61	148.37	[179.13]

[1] Items in brackets indicate winter gain and cattle price combination where return above feed cost is the greatest.

Table 4. RETURNS PER HEAD ABOVE WINTER FEED COSTS WITH HAY AT $20 AND $24 PER TON, BARLEY $60 PER TON, COTTONSEED MEAL $80 PER TON, AND VARYING CATTLE PRICES[1]

Daily rate of winter gain	Hay $20 per ton					Hay $24 per ton				
	Cattle prices per 100 lbs.					Cattle prices per 100 lbs.				
	$16.00	$20.00	$24.00	$28.00	$32.00	$16.00	$20.00	$24.00	$28.00	$32.00
.4	$69.32	$91.64	$113.96	$136.28	$158.60	$66.47	$88.80	$111.12	$133.44	$155.76
.6	70.74	94.34	117.94	141.54	165.14	67.81	91.41	115.01	138.61	162.21
.8	71.54	96.34	121.14	145.94	170.74	68.56	93.36	118.16	142.96	167.76
1.0	[71.90]	97.86	123.82	149.78	175.74	[68.93]	94.89	120.85	146.81	172.77
1.2	71.64	98.68	125.72	152.76	179.80	68.73	95.77	122.81	149.85	176.89
1.4	70.81	[98.85]	126.89	154.93	182.97	68.01	[96.06]	124.09	152.13	180.17
1.6	69.52	98.52	127.52	156.52	185.52	66.88	95.88	124.88	153.88	182.88
1.8	67.77	97.70	[127.62]	157.54	187.46	65.36	95.28	[125.20]	155.12	185.04
2.0	65.45	96.21	126.97	[157.73]	[188.49]	63.29	94.05	124.81	[155.57]	[186.33]

[1] Items in brackets indicate winter gain and cattle price combination where return above feed cost is the greatest.

Table 5. Returns per Head Above Winter Feed Costs with Hay at $20 and $24 per ton, Barley $50 per ton, Cottonseed Meal $80 per ton, and Varying Cattle Prices[1]

Daily rate of winter gain	Hay $20 per ton					Hay $24 per ton				
	Cattle prices per 100 lbs.					Cattle prices per 100 lbs.				
	$16.00	$20.00	$24.00	$28.00	$32.00	$16.00	$20.00	$24.00	$28.00	$32.00
.4	$69.68	$92.00	$114.32	$136.64	$158.96	$66.84	$89.16	$111.48	$133.80	$156.12
.6	71.64	95.24	118.84	142.44	166.04	68.71	92.31	115.91	139.51	163.11
.8	73.07	97.87	122.67	147.47	172.27	70.09	94.89	119.69	144.49	169.29
1.0	74.15	100.11	126.07	152.03	177.99	71.18	97.14	123.10	149.06	175.02
1.2	74.70	101.74	128.78	155.82	182.86	71.79	98.83	125.87	152.91	179.95
1.4	[74.77]	102.81	130.85	158.89	186.93	71.97	100.01	128.05	156.09	183.13
1.6	74.47	103.47	132.47	161.47	190.47	[72.03]	101.03	130.03	159.03	188.03
1.8	73.81	[103.73]	133.65	163.57	193.49	71.39	[101.31]	131.23	161.15	191.07
2.0	72.65	103.41	[134.17]	[164.93]	[195.69]	70.49	101.25	[132.01]	[162.77]	[193.53]

[1] Items in brackets indicate winter gain and cattle price combination where return above feed cost is the greatest.

Table 6. RETURNS PER HEAD ABOVE WINTER FEED COSTS WITH HAY AT $20 AND $24 PER TON, BARLEY $40 PER TON, COTTONSEED MEAL $80 PER TON, AND VARYING CATTLE PRICES[1]

Daily rate of winter gain	Hay $20 per ton					Hay $24 per ton				
	Cattle prices per 100 lbs.					Cattle prices per 100 lbs.				
	$16.00	$20.00	$24.00	$28.00	$32.00	$16.00	$20.00	$24.00	$28.00	$32.00
.4	$70.04	$92.36	$114.68	$137.00	$159.32	$67.20	$89.52	$111.84	$134.16	$156.48
.6	72.54	96.14	119.74	143.34	166.94	69.61	93.21	116.81	140.41	164.01
.8	74.60	99.40	124.20	149.00	173.80	71.62	96.42	121.22	146.02	170.82
1.0	76.40	102.36	128.32	154.28	180.24	73.43	99.39	125.35	151.31	177.27
1.2	77.76	104.80	131.84	158.18	185.92	74.85	101.89	128.93	155.97	183.01
1.4	78.73	106.77	134.81	162.85	190.89	75.93	103.97	132.01	160.05	188.09
1.6	79.42	108.42	137.42	166.42	195.42	76.78	105.78	134.78	163.78	192.78
1.8	79.84	109.76	139.68	169.60	199.52	77.42	107.34	137.26	167.18	197.10
2.0	[79.85]	[110.61]	[141.37]	[172.13]	[202.89]	[77.69]	[108.45]	[139.21]	]169.97[	[200.73]

[1] Items in brackets indicate winter gain and cattle price combination where return above feed cost is the greatest.

Table 7. Returns per Head Above Winter Feed Costs with Hay at $20 and $24 per ton, Barley $35 per ton, Cottonseed Meal $80 per ton, and Varying Cattle Prices[1]

Daily rate of winter gain	Hay $20 per ton					Hay $24 per ton				
	Cattle prices per 100 lbs.					Cattle prices per 100 lbs.				
	$16.00	$20.00	$24.00	$28.00	$32.00	$16.00	$20.00	$24.00	$28.00	$32.00
.4	$70.18	$92.50	$114.82	$137.14	$159.46	$67.34	$89.66	$111.98	$134.30	$156.62
.6	72.90	96.50	120.10	143.70	167.30	69.97	93.57	117.17	140.77	164.37
.8	75.21	100.01	124.81	149.61	174.41	72.23	97.03	121.83	146.63	171.43
1.0	77.30	103.26	129.22	155.18	181.14	74.33	100.29	126.25	152.21	178.17
1.2	78.98	106.02	133.08	160.10	187.14	76.07	103.11	130.15	157.19	184.23
1.4	80.31	108.35	136.39	164.43	192.47	77.51	105.55	133.59	161.63	189.67
1.6	81.40	110.40	139.40	168.40	197.40	78.76	107.76	136.76	165.76	194.76
1.8	82.25	112.17	142.09	172.01	201.93	79.83	109.75	139.67	169.59	199.51
2.0	[82.73]	[113.49]	[144.25]	[175.01]	[205.77]	[80.57]	[111.33]	[142.09]	[172.85]	[203.61]

[1] Items in brackets indicate winter gain and cattle price combination where return above feed cost is the greatest.