

RAISING



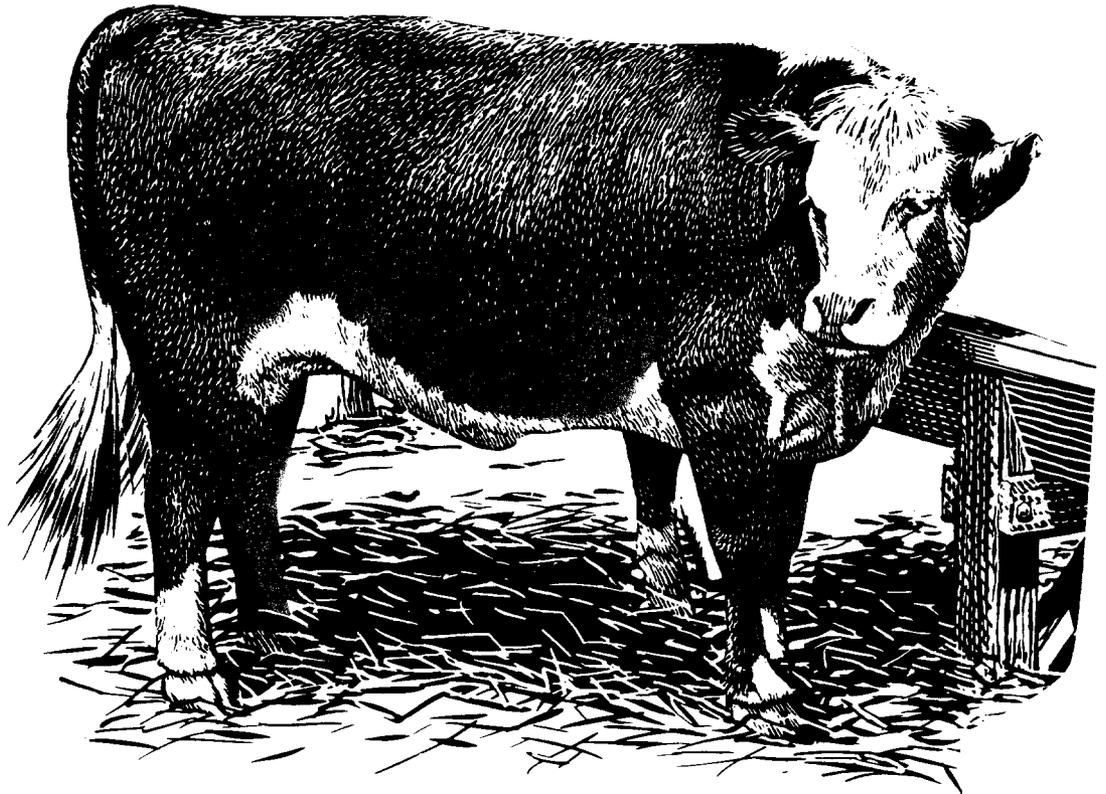
BEEF HEIFER REPLACEMENTS

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Operating a profitable beef cow herd requires considerable management expertise. Successful beef cow operators concentrate their limited management time on those factors that: (1) make a big difference in profitability of the beef cow herd and (2) can be influenced with management. The management decision to raise or purchase replacement heifers clearly meets both of these criteria.

The typical beef cow operator holds back approximately 40 percent of all heifer calves born for herd replacements. The purpose of this circular is to: (1) suggest some management practices that beef producers should consider when raising replacement heifers and (2) provide a recommended procedure for determining the cost of raising replacement heifers. With these production practices and cost procedures in mind, cattlemen can then decide if it is best to raise or purchase their replacement heifers.

Total Costs of Raising a Replacement Heifer

The projected total costs of raising a replacement heifer for 1988 are significant. Costs from conception to weaning are projected at \$361, costs from weaning to breeding are projected at \$123, and costs for the summer grazing period after breeding are projected at \$64. After adjusting for heifer conception rate and the value of cull heifers that are not bred, this gives a total projected cost of raising heifers from conception of the heifer until pregnancy check 18 months later of \$526 (see Table 1). Forty-seven dollars of this cost was needed to account for the time value of money (i.e., the interest cost).

Table 1. Projected Cost of Raising Medium Framed Replacement Heifers (1988).

1. Conception to Weaning	\$361
2. Weaning to Breeding	\$123
3. Breeding to Pregnancy Check	<u>\$ 64</u>
Sub-Total	\$548
4. Adjusted for Heifer Conception Rate	\$712
5. Adjusted for Cull Heifer Credit	\$526

Raising Replacement Heifers – A Recommended Procedure

The management of first calf heifers affects their performance for the rest of the animal's life. Inadequate management of replacement heifers can result in larger feed bills and/or more open females. The more open females, the higher the cost of raising replacement heifers. The net cost of raising both replacement heifers that get bred and those that do not has to be attributed to the bred heifer. The net cost is used because an open heifer has both an added cost and an added cull heifer return.

It is recommended that management of heifer replacements be separated into three time periods: (1) from cow conception to weaning of its heifer calf, (2) from weaning until breeding of the replacement heifer and (3) from breeding in the spring until fall pregnancy check. After pregnancy check, the bred heifer is assumed to be added to the cow herd.

1. Period One – Conception to Weaning

It is important that cattlemen take care in selecting heifer replacements from their potential heifer pool. Heifers born early in the calving season are usually heavier at weaning and reach puberty earlier than heifers born late in the calving season. Weaning weights of calves are positively correlated with milk production of their dams; therefore, selection of growthy, fast gaining heifers is also a selection for milk production. Conformation and condition should also be taken into account. Research suggests that heifers with excess condition will have more difficulty calving, will produce less milk, and will have a lower lifetime production than heifers in moderate condition.

Growth-promoting implants can be used in suckling calves to increase weaning weight but some are not approved for calves kept for breeding. Furthermore, no permanent benefit accrues to the herd replacement heifer implanted with a growth stimulant at any time in her life. Since it is usually not known which heifers will be kept for replacements, use caution when implanting heifer calves. Any reduction in reproductive performance substantially increases the cost of replacement heifers (see Table 11).

Costs of Production in Period One

The costs associated with the first time period (conception to weaning) can be estimated by using the opportunity cost concept. Opportunity cost is the value of a resource in its highest valued alternative. For example, the heifer calf could be

sold in the fall rather than retained as a potential replacement. The income that is forgone by not selling the calf is an opportunity cost; i.e., the cost of giving up the opportunity to obtain the sales value of the calf.

In this example, it was assumed that heifer calf, weighing 425 pounds, **could** have been sold for \$85 per hundred weight for a total of \$361 per head. Total costs for the conception to weaning time period is projected to be a \$361 opportunity cost of not selling the heifer calf.

2. Period Two – Weaning to Breeding

Proper precautions should be taken in the selection and development process to ensure that heifers will cycle and settle in the shortest period of time in the breeding season. If they do not become pregnant, **and not all of them will**, these costs must be borne by those heifers that do conceive and come into production as two-year-olds.

The second period covers from weaning to the time the heifer is bred as a replacement. This period covers a winter feeding period and one month's pasture. Costs in this category include winter feed and one month of pasture, labor, veterinarian, medical supplies, fuel, death loss, and miscellaneous expenses. Let's first concentrate on the winter feeding period.

Heifers must be bred at 14-15 months of age to calve as two-year-olds. Heifer calves are expected to reach puberty at approximately 65 percent of mature weight. Table 2 suggests the weight that must be achieved for puberty at 14-15 months of age. Individual weights rather than group weight should be considered, particularly if there is wide variation in birth dates.

Table 2. Impact of Mature Weight on Weight at Puberty.

Mature Weight	Weight at Puberty
900	585
1000	650
1100	715
1200	780
1300	845

Feeding heifers to gain 1.4 pounds per day will result in most medium framed heifers reaching the puberty weight by 14-15 months of age. Large framed heifers may need to gain 1.6 pounds per day to reach puberty by 14-15 months of age. If heifers are weaned in November and bred in June, they have about 210 days to gain the weight. Heifers going to pasture May 1 have a winter feeding period of approximately 180 days. Pasture gains of .75 to 1.4 pounds per day can be expected. Feeding 3 to 5 pounds of grain while breeding on pasture may be necessary when pasture conditions are not ideal.

To reach a target weight at breeding, cattlemen need to estimate the target average daily gain needed during the winter feeding program. Table 3 calculates the target average daily gain needed for the heifer wintering program. It first adjusts the target breeding weight for the one month's pasture gain and then calculates the needed gain during the winter feeding period. In this example, the target breeding weight is 725 pounds. When this is adjusted for pasture gain, the target weight needed at the end of the winter feeding period is 675 pounds. With a projected 181-day winter feeding period, this figures out to a target average daily gain of 1.38 pounds for the winter feeding program.

Table 3. Beef Heifer Replacement.

Weaning Weight of Heifers	425
Weaning Date	11/1/87
Mature Weight of Cows	1100
Target Breeding Wt	715
Gain needed to breed	290
Date to Grass	5/1/88
Target Breeding Date	6/1/88
Days on Grass	31
Target ADG ¹ on Grass	1.3
Days on Winter Feed	181
Target Winter Gain	250
Target Weight to Grass	675
Target Winter ADG	1.38

¹ADG is Average Daily Gain
Template HEIFER.CAL Disk #40

Feed accounts for a majority of the costs during the wintering period; therefore, it is mandatory to feed the replacement heifers as cheaply as possible without being detrimental to final breeding performance. The AGNET computer system's software entitled **FEEDMIX and BEEF** were used to prepare a winter budget for raising replacement heifers.

The **FEEDMIX** program is a least-cost ration balancer program. County agents, local feed companies, and private consultants also have microcomputer versions of similar ration balancers that will also formulate least-cost balanced rations. A least-cost ration balancer takes into account available home grown feeds and those feeds a producer is willing to purchase and formulates the lowest cost balanced ration attainable from the list of feeds.

The following feeds and their prices were used in this example analysis:

Barley	\$ 1.30/Bu
Alfalfa (mid bm)	\$45.00/Ton
Grass Hay (Mature)	\$35.00/Ton

The following grower ration was generated using these feeds to provide the lowest cost balanced ration meeting the nutrient requirements of the heifer (see Table 4). With the relatively low priced grain compared to price of forages, this least-cost balanced ration is approximately 44 percent grain and 56 percent forage. This daily ration consists of feeding 7.1 pounds of barley, 3.7 pounds of mid bloom alfalfa hay, 5.4 pounds of mature grass hay, and .01 pounds of calcium and phosphorus mineral. The mineral can be provided free-choice.

Table 4. AGNET's FEEDMIX Ration #8 for 500-700 lb Heifers (1-1.3 lb ADG).

Feed Name	Your Price	lb/HD/Day		Ration (%)	
		Dry	As Fed	100% Dry	As Fed
Barley	1.30	6.33	7.10	43.64	43.92
Alf Ha MB	45.00	3.30	3.67	22.76	22.65
Phs Dical	300.00	0.01	0.01	0.04	0.04
Grass Hay	35.00	<u>4.86</u>	<u>5.41</u>	<u>33.56</u>	<u>33.39</u>
Totals		14.50	16.19	100.00	100.00
Ration Cost	Dry Basis	As Fed Basis		Moisture Content	
→	2.56 \$/cwt	2.29 \$/cwt		10.44 %	
		45.78 \$/ton		(89.56%DM)	

It is projected that a 550-pound heifer (the target weight used in the ration formulation) will consume an average of 16.19 pounds of feed per day on an "as is" basis and 14.5 pounds of feed on a "dry matter" basis.

The total cost per ton of this feed comes to \$45.78. On a dry matter basis (with the water removed) the ration costs \$2.56 per hundred pounds of dry matter. The arrow (→) signifies that this dry matter cost is utilized in the Gain Projector.

This example ration is not intended to fit every producer's situation; each producer should formulate a least-cost, balanced ration with his own feeds. Local prices, feed availability and nutrient compositions of feedstuffs affect each producer's least-cost ration.

Local county agents can perform a least-cost ration analysis tailored to cattlemen's specific feeds available, their chemical feed analysis, and the cattle's specific nutrient needs. It is recommended that a cattle producer have a chemical analysis of available feeds to accurately determine nutrient quality when formulating least-cost balanced rations.

Table 5 presents: (1) the recommended nutrient requirements for a 425 pound heifer to gain 1.38 pounds per day to obtain the desired 675 pounds

at end of the winter feeding season and (2) the nutrient content of the suggested least-cost balanced ration. The ration was required to be 10.5 percent crude protein, have 41.47 megacalories of net energy for gain (NEG), have a calcium level between 0.35 and 2 percent, and have a minimum phosphorus level of 0.35 percent. The recommended calcium/phosphorus ratio is to be between 1:1 and 3:1.

Table 5. Nutrient and Quality Analysis for This Mix.

Requirement Name		100% DM		Lbs DM/Day Basis	
		Required	Actual	Required	Actual
1 Weight	EQ	100.00	100.00	14.50	14.50
2 Crude Prot	Min	10.50	10.50	1.63	1.63
3 NEM	MIN	0.0	68.77	0.0	10.66
4 NEG	MIN	41.47	41.47	6.43	6.43
5 TDN	MIN	0.0	64.63	0.0	10.02
6 CALC	MAX	2.00	0.75	0.31	0.12
7 PHOS	MIN	0.25	0.25	0.04	0.04

The suggested ration contains 10.5 percent crude protein, 41.47 megacalories of net energy for gain (NEG) per cwt of dry matter, 68.77 megacalories of net energy for maintenance (NEM) per cwt of dry matter, 0.75 percent calcium and 0.35 percent phosphorus. This calculates out to a 3:1 calcium/phosphorus ratio.

The net energy for gain (NEG) of the ration and the dry matter intake of the heifer calf heavily determine the heifer's average daily gain (ADG) through the winter feeding period. Table 6 suggests dry matter intake levels for different weight replacement heifers. Average weight was derived by adding together the weaning weight and the end of the winter feeding period target weight and dividing by 2; i.e.,

$$(675 + 425)/2 = 550 \text{ lbs}$$

Dry matter intake was projected at 2.6 percent of body weight giving a projected average dry matter intake of 14.5 pounds per day. This ration was formulated based on 14.5 pounds of dry matter intake per day.

Table 6. Suggested Dry Matter Heifer Growing Rations (lbs Feed - Dry Basis).

Body Weight (lbs)							
300	400	500	600	700	800	900	
8.5	11.5	13.5	15.5	17.5	19.5	21.0	

SOURCE: AGNET's FEEDMIX "help" printout.

Simulating the Growth of the Replacement Heifer with Specific Ration Adjusted to North Dakota's Weather Conditions

The AGNET gain projector program called **BEEF** was used to project the feedlot performance and the associated production costs of growing the replacement heifer during the winter feeding period. The gain projection was based on the following inputs:

1. Carrington, North Dakota 10-year average weather data
2. 10 cents per day non-feed costs
3. \$85/cwt heifer value
4. 11.25% interest rate
5. Initial weight - 425 pounds
6. Final Weight - 675 pounds
7. Frame score - 2.0 (out of a possible 4) for medium frame
8. Condition score - 2.0 (average)
9. Ten day adjustment period
10. NEG = 41.47 Meg Calories/cwt
11. NEM = 68.77 Meg Calories/cwt
12. Lot conditions (mud factor = 0) dry lot
13. Feed cost in \$/cwt of dry matter = \$2.56
14. Began feeding on Nov 1, 1987

This information was entered on the input sheet present in Table 7 and used as input into AGNET's BEEF program. The results of the heifer simulation is presented in Table 8.

The heifer growth simulation suggests that this particular ration projects a 1.37 pound average daily gain, adjusted for Carrington's average winter weather, for the entire feeding period (see bottom of Table 8). The average dry feed intake projected to be 14.25 pounds per day giving a projected total dry matter feed need of 2607.87 pounds for the winter feeding period. The average feed conversion efficiency is projected to 10.41 lbs of dry feed per pound of gain.

Data from the actual ration and the grower simulation can be used to project the total winter feed required to winter a replacement heifer. The total feeding program (Table 9) consists of 26.3 bushels of barley, 0.32 tons of mid bloom alfalfa hay, 0.49 tons of mature grass hay, and 1.04 pounds of di-calcium phosphate mineral.

Production Costs Associated with the Winter Feeding Period and Breeding

Projected feedlot costs for the wintering period are presented in Table 10.

Feed costs represent the majority of the winter production expenses and are projected to amount to \$66.76 per head or \$.27 per pound gained. The nonfed costs (veterinarian, medical supplies, death loss, fuel, and labor) were estimated at \$.10 per head per day, resulting in an \$18.30 cost for the period or \$.07 per pound of gain. Interest

Table 7. Beef Program Input Form.

1. Do you want to calculate costs, returns, or performance only?
COSTS ONLY

2. Enter desired weather location.
CARRINGTON, NORTH DAKOTA

3. Estimate non-feed costs in dollars per head per day?
\$0.10

4. A) Initial Weight	B) Market Weight	C) Report Interval (Wks)	D) Feeder Cost (\$ cwt)	E) Interest Rate	
<u>425</u>	<u>675</u>	<u>1</u>	<u>\$85</u>	<u>11.25%</u>	
5. A) Frame Score	B) Condition Score	C) Tissue Shrink (%)	D) Adjustment Period (Days)	E) Sex	
<u>MEDIUM</u>	<u>AVERAGE</u>	<u>0.0%</u>	<u>10</u>	<u>HEIFERS</u>	
6. A) Net Energy for Gain	B) Net Energy for Maint.	C) Mud Factor (0 to 5)	D) Final Weight (Lbs)	E) Feed Cost (\$ cwt/Dry)	F) Start Date (M,D)
<u>41.47</u>	<u>68.09</u>	<u>0 (DRY LOT)</u>	<u>675</u>	<u>\$2.56</u>	<u>NOV 1, 1987</u>

Table 8. Projected Feedlot Performance, Carrington, North Dakota, 1987.

Using Carrington, North Dakota Average Weather Data								
Date	Ave. Temp	Current Feedlot Weight	Gain		Average Dry Feed Intake	Average Efficiency	Cost/lb Gain (Cents)	
			This Period	Average To-date			This Period	To Date
11 7	35.8	428.91	0.56	0.56	11.97	21.45	93.06	93.06
11 14	31.9	438.14	1.32	0.94	12.12	9.18	39.65	55.53
11 21	28.0	447.67	1.36	1.08	12.31	9.05	38.81	48.50
11 28	24.3	457.07	1.34	1.15	12.51	9.31	39.67	45.91
12 5	20.9	466.37	1.33	1.18	12.70	9.56	40.51	44.70
12 12	17.7	475.57	1.31	1.20	12.89	9.81	41.30	44.08
12 19	15.0	484.70	1.30	1.22	13.07	10.03	42.01	43.76
12 26	12.6	493.67	1.28	1.23	13.26	10.33	43.05	43.67
1 2	10.8	502.40	1.25	1.23	13.43	10.77	44.66	43.78
1 9	9.6	511.03	1.23	1.23	13.60	11.03	45.51	43.96
1 16	8.9	519.75	1.24	1.23	13.77	11.06	45.42	44.09
1 23	8.8	528.73	1.28	1.23	13.94	10.87	44.42	44.12
1 30	9.3	537.92	1.31	1.24	14.12	10.75	43.73	44.09
2 6	10.3	547.23	1.33	1.25	14.30	10.75	43.53	44.05
2 13	12.0	556.68	1.35	1.25	14.48	10.72	43.22	43.99
2 20	14.1	566.29	1.37	1.26	14.66	10.67	42.82	43.91
2 27	16.7	576.09	1.40	1.27	14.84	10.60	42.35	43.81
3 5	19.7	586.09	1.43	1.28	15.03	10.52	41.83	43.68
3 12	23.1	596.31	1.46	1.29	15.22	10.43	41.29	43.54
3 19	26.6	606.74	1.49	1.30	15.41	10.34	40.75	43.38
3 26	30.4	617.40	1.52	1.31	15.60	10.25	40.22	43.21
4 2	34.2	628.27	1.55	1.32	15.80	10.17	39.73	43.02
4 9	38.1	639.36	1.58	1.33	15.99	10.10	39.29	42.83
4 16	41.9	650.64	1.61	1.34	16.19	10.04	38.91	42.63
4 23	45.6	662.11	1.64	1.35	16.38	10.00	38.59	42.44
4 30	49.1	673.74	1.66	1.37	16.58	9.98	38.35	42.25
5 1	51.0	675.41	1.67	1.37	16.68	9.97	38.25	42.22
Total Average				250.41 1.37	2607.87 14.25	10.41	\$42.22	

Table 9. Calculating Total Winter Feed Requirements Per Head.

Feed in Ration	% in Ration	Total Dry Matter	Adjust For Water	LBS Fed (As Is)	Units Per Head	Feed Requirements
Barley	43.64%	$2607.87 \times 43.64\% = 1138/.90$		$= 1264/48$	$= 26.3$ BU	Barley 26.30 BU
Alfalfa hay	22.76%	$2607.87 \times 22.76\% = 594/.90$		$= 660/2000$	$= 0.32$ T	Alfalfa 0.32 TON
Grass Hay	33.56%	$2607.87 \times 33.56\% = 875/.90$		$= 972/2000$	$= 0.49$ T	Grass Hay 0.49 TON
Di-Cal	0.04%	$2607.87 \times 0.04\% = 1.04/1.0$		$= 1.04/1.0$	$= 1.04$ LBS	Phs DiCal 1.04 LBS

accounted for \$20.66 per head or \$.08 per pound of gain. Total wintering feeding costs are projected at \$105.72 or \$.42 per pound of gain.

Total costs to produce a replacement heifer calf from weaning to breeding are estimated to be \$122.40 (\$105.72 plus \$17.19).

A month of pasture costs plus some additional grain is assumed prior to breeding June 15, 1988. These costs are projected as follows:

Pasture (\$7/AUM x 0.9 AUM)	= \$ 6.30
Feed (3 lbs grain/day @ \$0.032) (3 x .032 x 30 days)	= \$ 3.00
Non-feed costs (\$0.10/day)	= \$ 3.00
Interest on previous investment (\$361 plus \$105.72 for 1 month)	= \$ 4.38
TOTAL	\$16.68

Table 10. Projected Winter Feedlot Costs.

Feedlot Costs	per head	per lb	
Feed	\$ 66.76	\$0.27	@ \$2.56 per dry cwt
Non-feed	\$ 18.30	\$0.07	@ \$0.10 per day
Interest	\$ 20.66	\$0.08	@ 11.25% per yr
Total	\$105.72	\$0.42	

Recommended Management Practices

Measuring pelvic areas in heifers two to three weeks before they are bred will assist in reducing calving difficulties. This procedure can identify many potential calving difficulties cases. Do not select heifers for large pelvic areas; just don't select the heifers with smallest pelvic areas.

Pelvic measurements can cost \$2-3 per head. The cost of the procedure would be about \$250 for 100 head of heifers. The cost is less than feeding one heifer over winter and then paying the C-section at calving time.

The procedure takes about the same length of time as pregnancy testing. A width and height measurement is taken with a tool called a "pelvimenter." The measurements are usually in centimeters. The height and width are multiplied together to get the pelvic area in square centimeters. A rule of thumb is that for every 2 square centimeters of pelvic area at breeding, a heifer should be able to have 1 pound of calf birth weight.

A condition resulting in the over development of on or both ovaries is called ovarian hyperplasia. The left ovary is more frequently affected than the right.

It is recommended that breeding heifers calve 20 to 30 days ahead of the cow herd to allow the heifers more time to rebreed after calving. Heifers that calve later will likely calve late the rest of their lives or miss at least one pregnancy. An added advantage of breeding heifers before the cow herd is that the cattlemen can spend more time checking and assisting heifers with calving difficulty.

Normally, a young, light bull should be used to breed heifers. This reduces the risk of injury to the heifer at breeding as the heifer needs to support less weight than if she were bred by a mature bull. About 60 days after removing the bull, pregnancy check and cull open heifers. If over 20 percent of yearling heifers are open after a 45-day breeding season, the heifer replacement program merits some scrutiny.

Some management strategies that should be considered when breeding heifers include: 1) start breeding heifers 20-30 days before the cow herd, 2) limit the breeding season to 45 days, and 3) expose approximately 30 percent more heifers for breeding than are needed.

3. Period Three – Breeding to Pregnancy Check in Fall

The third period associated with raising replacements is the five months of additional pasture running from breeding to fall pregnancy check.

Costs of Production While on Grass

This period is assumed to be five additional months of pasture. At \$7 per animal unit month (AUM) and assuming a yearling heifer requires 0.9 AUMs, this figures out to:

$$\$7.00 \times .9 \times 5 \text{ months} = \$31.50$$

Breeding costs are estimated at \$10 per conception and the time value of money for this five months (\$361 plus \$122.40 for five months) comes to:

$$(\$361 + \$122.40) \times (150/365) \times .1125 = \$22.39$$

This brings the total cost of period three to \$63.89 (\$31.50 + \$10.00 + \$22.39) per replacement heifer.

Total Cost of Raising Replacement Heifers

This gives a total projected cost of raising heifers from conception of the heifer until pregnancy check 18 months later of \$548 (see Table 1).

Adjusting for Heifer Conception Percentage

To insure that a bred heifer (rather than an open heifer) is available to replace a culled cow, cattlemen will need to raise extra replacement heifers to correct for heifer conception rate. Table 11 provides some suggested conception rates that can be used to adjust the \$548 for heifer calving rate. The first two columns of Table 11 present some research giving percent calf crop for alternative weaning weights. The third column uses the conception rate to calculate the number of replacement heifers that need to be exposed to the bull to get one pregnant heifer.

The total cost of \$548 (from Table 1) can be adjusted for heifer calf crop by dividing the \$548 cost by the calving percentage. This example illustrates the cost of growing a 425-pound medium framed heifer calf into a replacement heifer. Using the heifer calving percentage suggested for that weight in Table 11, the adjusted cost of raising the replacement heifers is \$712 per head; i.e.,

$$\$548/0.77 = \$712 \text{ per head}$$

The adjusted costs of raising replacement heifers for alternative heifer weaning weights are presented in Table 11.

Since not all heifers conceive, the unbred heifers will need to be culled. Table 11, column 6, adjusts the cost of raising replacement heifers by the value of the unbred cull heifers (column 5). The cull heifers are assumed sold off grass at 875

Table 11. Adjusting Replacement Costs for Heifer Conception Rate.

Weaning Weight	% Heifer Conception	Heifers Needed	Cost of Replacement @ \$548.00	Credit 875# Cull Heifer @ \$65.00	Net Cost of Replacement
350	69%	1.45	\$794	\$256	\$539
351-399	67%	1.49	\$818	\$280	\$538
400-449	77%	1.30	\$712	\$170	\$541
450-499	87%	1.15	\$630	\$ 85	\$545
500-550	90%	1.11	\$609	\$ 63	\$546

pounds at \$65 per hundredweight. Typically, 875 pound grass heifers are over weight for feedlot heifers and will receive a price discount. Since 1.3 replacement heifers are needed for the one bred replacement heifer needed, we have .3 cull heifers to sell. This .3 heifer (875 lbs x 0.3 = 262 lbs) is valued by multiplying \$65 per hundredweight times 2.62 hundredweights giving a \$170 cull heifer credit. This reduces the total cost of raising the example replacement heifer to \$542 per bred replacement heifer.

As is illustrated in Table 11, the cost of raising replacement heifers is dependent on percent heifer conception. Since the value of the cull heifer is higher than the cost of raising the heifer, the cost of replacement heifers is higher at the higher conception rates. In years when the cost of raising replacement heifers is higher than the value of the cull heifer, the higher conception rates will have the lower costs of replacement heifers.

Care of the Replacement Heifer After it is Put in the Cow Herd

A two-year-old heifer should weigh 85 percent of her mature weight at first calving. Table 12 presents a set of target weights for heifers at calving.

Table 12. Suggested Weight of Calves at First Calving.

Mature Weight	Weight at First Calving
900	765
1000	850
1100	935
1200	1020
1300	1105

Cost Summary

The costs of raising replacement heifers count up. This analysis projects that the cost to raise replacement heifers is approximately \$542 per head. Costs from conception to weaning are projected at \$361, the costs from weaning to breeding are projected at \$122, and the final grazing period is projected to cost \$64. This gives a total projected cost of raising heifers from conception of the heifer until pregnancy check 18 months later of \$548 (see Table 1). Forty-seven dollars of this cost was needed to account for the time value of money, the interest cost. When this \$548 is adjusted for heifer conception rate (see Table 11), the total cost of raising replacement heifers ranges from \$538 to \$546.

Replacement heifers have approximately 280 days to gain the weight from breeding to calving. Bred heifers should gain about 0.7-1 pound per day from breeding to calving. Replacement heifers may reach the target weight coming off good pasture in the fall. If this is the case, they need to only maintain their weight through the winter. On the other hand, winter feed levels will need to be increased if the replacement heifers have not reached their target weight by fall. It is important to provide enough feed without getting the heifers too fat at calving time.

Replacement heifers and thin cows should be fed as separate groups from the main herd. Heifers may not get all the feed they need in the main herd because they are smaller and more timid. They are at the bottom of the social ladder and will thus eat less and not get the higher quality material in the roughage.

Breeding for the Second Calf Can Be a Problem

Breeding heifers at puberty is usually easier than rebreeding them after their first calf. The greatest portion of females being culled for failure to rebreed are the first-calf heifers. The main reason for the breeding failures of first-calf heifers is nutritional stress. First-calf heifers need more

energy, protein, and minerals after calving than mature cows because they are still growing in addition to producing milk.

Failure to supply sufficient energy after calving will result in delayed return to heat and failure to breed within a normal breeding season. Young cows should gain 100 to 150 pounds after weaning their first calf and calving again as a three-year-old.

Early calving heifers have more time to rebreed and should have their second calf with the rest of the cow herd. Research has demonstrated that the average interval from calving to first estrus is 49 days in older cows and 67 days in young cows with suckling calves. Calving interval can be shortened with above average nutrition after calving, but this requires special management attention with first-calf heifers.

Total Herd Budgets with Raised or Purchased Replacements

There are two kinds of enterprise budgets that cow-calf producers should utilize. The first is an “economic budget” based on opportunity costs. The second is a “cash flow budget” based on out-of-pocket costs. It is essential to understand the distinction between opportunity costs and cash flow budgets.

The economic budget is based on the assumption that the cow herd has to pay the “opportunity cost” of the resources used. That is, if the local elevator will pay \$1.90 for oats, then the cow herd should be charged the \$1.90 opportunity cost of the oats fed to the cow herd. This opportunity cost concept should be utilized for all resources depleted by the cow herd.

The “cash flow budget” calculates only the out-of-pocket costs that a beef-cow producer incurs. For example, if the beef cow producer raises the oats fed to the cow herd, only the out-of-pocket production costs are charged to cash flow costs in the cow herd.

Appendices 1 and 2 present an “economic budget” on the right and a “cashflow budget” on the left for a 100 cow herd. Appendix 1 assumes that the replacement heifers are raised and

Appendix 2 assumes that the replacement heifers are purchased as bred heifers.

Comparing the two budget summaries at the end of each appendix points out the typical economics of raising or purchasing replacement heifers. From a profitability standpoint, these budgets suggest that profits are increased by purchasing replacement heifers (see right-hand side of budget summaries).

If the cow herd is being operated with equity capital, cash costs will generally be less than opportunity costs. If the cow herd is being operated with borrowed capital, cash costs will include both interest and principal payments and may be more than opportunity costs. Since each cattle producer’s equity position is different, each operation needs to tailor its beef-cow enterprise budget to its own unique equity situation.

Cashflow, on the other hand, is decreased by purchasing replacement heifers (see left-hand side of appendices). While gross receipts are increased by selling all heifer calves, replacement heifers must also be purchased. The cash cost of purchasing replacement heifers is added to the fixed costs in Appendix 2. Net cashflow is projected to be the highest for raising replacement heifers.

Since most cow-calf producers are typically more concerned about cashflow than they are about profits, producers generally prefer to raise their own replacement heifers.

Word of Caution

The margin for error in properly raising replacement heifers is small. If the heifers are fed too little they will not become pregnant at the appropriate time and they will not have their first calf at two years of age. If heifers are fed in excess they will become fat, decrease their productive life and create unnecessary production costs. Therein lies the challenge to the cow-calf producer.

APPENDIX 1

Beef Cow Budget with Raised Replacements

BEEF COW HERD SELLING WEANED CALVES IN FALL 1987-91 LONG-RUN DATE: 3/16/88

DESCRIPTION		
A spring calving	100-cow herd weaning	90% calf crop.
Hfr calves weigh	420 lbs. & steer calves weigh	450 lbs.
Cow death loss of	1% rate and	15% cow culling rate.
Suggested heifer conception	77% Actual conception	85%
Feed requirements include	100 cows and	19 replacement hfrs.
	3 bulls. Calves sold in the fall at 5-8 months old with a	
	4% transit shrink. Cow on pasture	180 days with
	30 days addition on aftermath.	
	1 Code 1 for raised or 2 for purchased replacement heifers.	

RECEIPTS					
	Steers	45 head	432 pounds	\$.80/lb =	\$15,552
	Heifers	26 head	403 pounds	\$.75/lb =	\$7,916
	Cull cows	14 head	900 pounds	\$.45/lb =	\$5,670
	Cull Hfrs	4 head	875 pounds	\$.65/lb =	\$2,175
	Cull Bull	1 head	1700 pounds	\$.50/lb =	\$850
Total Income Per Herd					\$32,162
Total Income Per Cow					\$322

FEED EXPENSE					
Cash Flow	180 Summer Pasture Program			Opportunity Cost	
\$372	\$.50 Pasture	743 AUMs	\$7.00/AUM =	\$5,204	
\$8	\$.50 Rpl Hfrs	.9 AUM/HD	\$7.00/AUM =	\$712	
\$395	\$400.00 Min&salt	.99 ton	\$400.00/ton =	\$395	
155 Day Winter Feeding Program					
\$164	\$.75 Oats	218.0 bushels	\$1.90/bu =	\$414	
\$350	\$140.00 Protein	2.5 ton	\$140.00/ton =	\$350	
\$3,375	\$15.00 Hay	225.0 ton	\$45.00/ton =	\$10,125	
\$0	\$10.00 Corn Sil	.0 ton	\$13.00/ton =	\$0	
\$0	\$5.00 Oat Straw	.0 ton	\$20.00/ton =	\$0	
\$406	400 Min&salt	1.01 ton	\$400.00/ton =	\$406	
\$30	\$.01 Aftermath	30 days	\$.10/day =	\$300	
Heifer	Feed included	14.25 lbs DMI	\$2.56\$/Cwt Dry	xxxx	
(BEEF GROWER DATA)					
\$5,099	Total Feed Cost Per Herd			\$17,905	
\$51	Feed Cost Per Cow			\$179	

LIVESTOCK EXPENSES

Cash Flow			Opportunity Cost
\$808	Vet and Medicine	\$8.08/cow	\$808
\$350	Fly Tags	\$3.50/cow	\$350
\$60	Bull Semen Check	\$20.00/bull	\$60
\$0	Worm Cows & Heifers	\$.00/head	\$0
\$868	Utilities & Gen farm	\$8.68/cow	\$868
\$906	Power and Fuel	\$9.06/cow	\$906
\$701	Miscellaneous	\$7.01/cow	\$701
\$800	Marketing	\$8.00/cow	\$800
\$4,493			\$4,493

Bull Depreciation			
	Loan		
	\$0 total	a: purchase price	\$1,750/bull
Loan Pmt	12% APR	b: salvage value	\$850
\$0	1 yrs	c: years of use	3.00
\$53		d: insurance	1%
\$1,750	xxxx xxxxxx	e: cash pmt for new bulls	xxxxxx

\$0	\$00	Bedding	\$2.00/cow	\$200
\$0	0%	Interest Feed & Lvstk	.00% @ 6 Mo	\$0
\$6,296		Total Livestock Costs		\$5,646
\$63		Livestock Costs Per Cow		\$56

FIXED EXPENSES

Cash Flow					Opportunity Cost
	Depreciation, Repairs, Taxes & Insurance				
\$100	2% Total Bldg Invest	\$5,000	7%		\$350
\$300	3% Total Eqmt Invest	\$10,000	13%		\$1,300
\$650	1% Investment/cow	\$650	1%		\$650
\$105	1% Heifer investment	\$700	1%		\$132
\$53	1% Bull Investment	\$5,251	1%		\$53
xxxxx	Total Inv/Cow	\$984	xxxx		xxxxxx

Loan Pmt	Interest on Investment	Capital At	In Rate	Years	Dollars
\$0	\$0 Total Bldg Invest	\$5,000	12%	15	xxxx
\$0	\$10 Total Eqmt Invest	\$10,000	12%	10	xxxx
\$0	\$0 Investment/Cow \$	\$650	12%	7	xxxx
\$0	\$0 Investment/Heifer	\$700	12%	1	xxxx
xxxxx	xxxx Average Bull Value	\$1,300	12%	xxxx	xxxx
\$1,208		Total Fixed Cost Per Herd			\$2,484
\$12		Total Fixed Costs per Cow			\$25

COST/RETURN SUMMARY

Cash Flow		Opportunity Cost
\$32,162	Receipts	\$32,162
\$11,394	Less Feed and Livestock Expenses	\$23,550
\$20,768	Returns Above Variable Costs	\$8,612
\$1,208	Less Fixed Expenses	\$2,484
\$19,560	Returns to Labor & Mgt, & Equity Capital per Herd	\$6,128
\$321.62	Total Receipts Per Cow	\$321.62
\$126.02	Total Expenses Per Cow	\$260.34
\$195.60	Returns to Labor & Mgt, & Equity Capital Per Cow	\$61.28

SOURCE: COW-CALF Cal on Disk#24.

APPENDIX 2

Beef Cow Budget with Purchased Replacements

BEEF COW HERD SELLING WEANED CALVES IN FALL 1987-91 LONG-RUN DATE: 3/16/88

DESCRIPTION		
A spring calving	100-cow herd weaning	90% calf crop.
Hfr calves weigh	420 lbs. & steer calves weigh	450 lbs.
Cow death loss of	1% rate and	15% cow culling rate.
Suggested heifer conception	77% Actual conception	85%
Feed requirements include	100 cows and	19 replacement hfrs.
	3 bulls. Calves sold in the fall at 5-8 months old with a	
	4% transit shrink. Cow on pasture	180 days with
	30 days addition on aftermath.	
	2 Code 1 for raised or 2 for purchased replacement heifers.	

RECEIPTS					
	Steers	45 head	432 pounds	\$.80/lb =	\$15,552
	Heifers	45 head	403 pounds	\$.75/lb =	\$13,608
	Cull cows	14 head	900 pounds	\$.45/lb =	\$5,670
	Cull Hfrs	0 head	875 pounds	\$.65/lb =	\$0
	Cull Bull	1 head	1700 pounds	\$.50/lb =	\$850
					Total Income Per Herd
					\$35,680
					Total Income Per Cow
					\$357

FEED EXPENSE				
Cash Flow	180 Summer Pasture Program			Opportunity Cost
\$372	\$.50 Pasture	743 AUMs	\$7.00/AUM =	\$5,204
\$0	\$.50 Rpl Hfrs	0 AUM/HD	\$7.00/AUM =	\$0
\$395	\$400.00 Min&salt	.99 ton	\$400.00/ton =	\$395
155 Day Winter Feeding Program				
\$164	\$.75 Oats	218.0 bushels	\$1.90/bu =	\$414
\$350	\$140.00 Protein	2.5 ton	\$140.00/ton =	\$350
\$3,375	\$15.00 Hay	225.0 ton	\$45.00/ton =	\$10,125
\$0	\$10.00 Corn Sil	.0 ton	\$13.00/ton =	\$0
\$0	\$5.00 Oat Straw	.0 ton	\$20.00/ton =	\$0
\$406	400 Min&salt	1.01 ton	\$400.00/ton =	\$406
\$30	\$.01 Aftermath	30 days	\$.10/day =	\$300
Purchased Heifer Feed Saved		14.25 lbs DMI	\$2.56\$/Cwt Dry	\$ - 1,236
(BEEF GROWER DATA)				
\$5,090	Total Feed Cost Per Herd			\$15,957
\$51	Feed Cost Per Cow			\$160

LIVESTOCK EXPENSES

Cash Flow			Opportunity Cost
\$808	Vet and Medicine	\$8.08/cow	\$808
\$350	Fly Tags	\$3.50/cow	\$350
\$60	Bull Semen Check	\$20.00/bull	\$60
\$0	Worm Cows & Heifers	\$0.00/head	\$0
\$868	Utilities & Gen farm	\$8.68/cow	\$868
\$906	Power and Fuel	\$9.06/cow	\$906
\$701	Miscellaneous	\$7.01/cow	\$701
<u>\$800</u>	Marketing	\$8.00/cow	<u>\$800</u>
\$4,493			\$4,493

Bull Depreciation			
	Loan		
	\$0 total	a: purchase price	\$1,750/bull
Loan Pmt	12% APR	b: salvage value	\$850
\$0	1 yrs	c: years of use	3.00
\$53		d: insurance	1%
\$1,750	xxxx xxxxxx	e: cash pmt for new bulls	xxxxx

\$0	\$0.00	Bedding	\$2.00/cow	\$200
\$0	0%	Interest Feed & Lvstk	.00% @6 Mo	\$0
\$6,296		Total Livestock Costs		\$5,646
\$63		Livestock Costs per Cow		\$56

FIXED EXPENSES

Cash Flow					Opportunity Cost
	Depreciation, Repairs, Taxes & Insurance				
\$100	2% Total Bldg Invest	\$5,000	7%		\$350
\$300	3% Total Eqmt Invest	\$10,000	13%		\$1,300
\$650	1% Investment/cow	\$650	1%		\$650
\$105	1% Heifer investment	\$700	1%		\$132
\$53	1% Bull Investment	\$5,251	1%		\$53
xxxxx	Total Inv/Cow	\$984	xxxx		xxxxx

Loan Pmt	Interest on Investment	Capital At	In Rate	Years	Dollars
\$0	\$0 Total Bldg Invest	\$5,000	12%	15	xxxx
\$0	\$10 Total Eqmt Invest	\$10,000	12%	10	xxxx
\$0	\$0 Investment/Cow \$	\$650	12%	7	xxxx
\$11,760	\$10,500 Investment/Heifer	\$700	12%	1	\$1,892
xxxxx	xxxx Average Bull Value	\$1,300	12%	xxxx	xxxx
\$12,968	Total Fixed Cost Per Herd				\$4,376
\$130	Total Fixed Costs per Cow				\$44

COST/RETURN SUMMARY

Cash Flow		Opportunity Cost
\$35,680	Receipts	\$35,680
\$11,386	Less Feed and Livestock Expenses	\$21,603
\$24,294	Returns Above Variable Costs	\$14,077
\$12,968	Less Fixed Expenses	\$4,376
\$11,327	Returns to Labor & Mgt, & Equity Capital Per Herd	\$9,701
\$356.80	Total Receipts Per Cow	\$356.80
\$243.53	Total Expenses Per Cow	\$259.79
\$113.27	Returns to Labor & Mgt, & Equity Capital Per Cow	\$97.01

SOURCE: COW-CALF Cal on Disk#24.

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