



Replacement Heifer Purchase Stress Test

EXTENSION

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Recent prolonged drought in the western United States has led to more culled cows and fewer replacement heifers. The inventory of US beef cows was 3.6% lower in January 2023 than the previous year and the lowest since 2014. Similarly, beef replacement heifer numbers were down 5.6% in January 2023 and the lowest in over a decade (LMIC 2023). As a result, the 2023 calf crop is going to be reduced from previous years and calf prices will reflect the reduced supply.

When rain comes and pasture and forage conditions improve, cow-calf producers will rebuild herds. Recovery will be expensive, either due to reducing sales to retain heifers or purchasing replacement heifers. A lower supply of heifers (and calves in general) will mean calf prices will be much higher than long-term average prices. In the Fall 2014, the last time the industry was rebuilding from drought, heifer calf prices ranged from \$230 per cwt to almost \$250 per cwt for six weight heifers. There were numerous lots of light weight heifers selling for over \$300 per cwt (LMIC 2023).

Cow-calf producers looking to rebuild cow inventories need to be aware of the potential hit to their financial positions from leveraged replacement heifer purchases. Six hundred pound heifers purchased in Fall 2023 will not generate calf revenue until Fall 2025. So, debt service, feed expense and other cash expenses will require other sources of cash flow. This adds strain to the ranch business which likely is already stressed from reduced calf production and higher per head feed costs.

Financed purchases can lead to poor financial health as measured by standard liquidity and equity measures. For example, borrowed funds to purchase replacement heifers increases nearby principal and interest payments, so the business' current ratio and working capital are reduced. Debt-to-asset, debt-to-equity and other measures of equity position are increased due to an increase amount of debt relative to the business' asset base.

To help evaluate the financial stress associated with replacement heifer purchases financed with debt, we developed a spreadsheet tool. The "Heifer Purchase Financial

Stress Analysis Tool" allows producers and lenders to enter information related to anticipated replacement heifer purchases, future production expenses and future calf and cull cow revenues to forecast impact on cash flow, liquidity and equity position.

In Figure 1, a screen capture of the tool is shown. The tool is programmed in MS Excel using macros for calculations and formatting. There are four blocks of information in the tool. In the first block (top of entry form), the user enters anticipated purchase, financing information, mature cow weight and percent of heifer crop retained annually. A "button" control (cell F3) allows the user to select from bred or open heifers. This information is used to calculate annual principal and interest obligations and future calf revenues.

The second block requires the user to enter information about anticipated production cost (\$/head), culling percentages, cull cow prices (\$/head) and, calf weaning weights (lbs. per head) and sale prices (\$/cwt). A weaning weight model taken from Bir et al. (2018) is automatically computed based on mature cow weight, cow age and calf sex. To use the calculated weaning weights, click on any cell in the light green column under "Steer weaning weight lbs" and/or "Heifer weaning weight lbs" to transfer the calculated weights for steers and heifers, respectively. Enter feed cost and other costs in dollars per head. Steer and heifer sale prices are entered in dollars per cwt. In the column "% calf crop," enter the calf weaning percentage of cows exposed. Next, enter the percent of cows of each age culled. Finally, enter cull cow price in dollars per head.

The last three columns in the second block report anticipated operating cash flow, principal interest payments and cash surplus (or deficit) in dollars per head. The spreadsheet calculates the number of heifers/cows remaining at the end of the year. Total operating cash flow less down payment assumes

¹ *Macros must be enabled if a security warning is visible when running the tool.*

Heifer Purchase Financial Stress Analysis Tool

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Head purchased		100	Bred												
Heifer purchase price \$/head		\$ 1,800	Anticipated mature cow weight lbs.		1375	Down payment \$/head		\$ 400	Heifer retention rate %		50%	Notes: Cells in light green are user entered. Blue, Red, Green and Yellow are calculated.			
Interest rate		9%	Enable macros to see calculations.												
Term (years)		5													
Age	Steer weaning weight Bir et al. lbs	Steer weaning weight lbs	Heifer weaning weight Bir et al. lbs	Heifer weaning weight lbs	Annual feed cost \$/head*	Annual other costs \$/head	Streer sale price \$/cwt	Heifer sale price \$/cwt	% Calf crop	% Cull by cow age	Cull cow price \$/head	End of Year Head Remaining (Culled)	TOTAL Operating cash flow less down payment	TOTAL Principal and interest	TOTAL Cash surplus or deficit
1	--	--	--	--	\$ 600	\$ 25	--	--	--	0%	\$ 1,400	100 (0)	\$0	\$ -	\$ -
2	449	449	434	434	\$ 600	\$ 50	\$ 250	\$ 235	82%	25%	\$ 810	75 (25)	\$3,088	\$ (35,993)	\$ (32,905)
3	466	466	451	451	\$ 625	\$ 50	\$ 243	\$ 228	86%	10%	\$ 1,080	67 (8)	\$11,115	\$ (35,993)	\$ (24,878)
4	480	480	465	465	\$ 650	\$ 50	\$ 238	\$ 223	87%	10%	\$ 1,125	60 (7)	\$9,381	\$ (35,993)	\$ (26,612)
5	491	491	475	475	\$ 675	\$ 50	\$ 235	\$ 220	87%	12%	\$ 1,170	53 (7)	\$8,442	\$ (35,993)	\$ (27,551)
6	497	497	482	482	\$ 700	\$ 50	\$ 230	\$ 215	87%	20%	\$ 1,238	42 (11)	\$12,163	\$ (35,993)	\$ (23,831)
7	499	499	484	484	\$ 700	\$ 50	\$ 225	\$ 210	87%	30%	\$ 1,238	29 (13)	\$14,386	\$ -	\$ 14,386
8	497	497	482	482	\$ 700	\$ 50	\$ 226	\$ 211	87%	40%	\$ 1,238	17 (12)	\$13,684	\$ -	\$ 13,684
9	492	492	477	477	\$ 725	\$ 50	\$ 228	\$ 213	87%	75%	\$ 1,238	4 (13)	\$14,965	\$ -	\$ 14,965
10	483	483	468	468	\$ 750	\$ 50	\$ 236	\$ 221	86%	100%	\$ 1,238	0 (4)	\$4,600	\$ -	\$ 4,600

Balance Sheet and Ratio Analysis

Enter Information as of *BEFORE* Heifer Purchase

Assets	
Current Assets	\$ 1,325,000
Intermediate Assets	\$ 1,800,000
Long-term Assets	\$ 15,125,000
Total Assets	\$ 4,080,000

Liabilities and Equity	
Current Liabilities	\$ 1,325,000
Intermediate Liabilities	\$ 2,400,000
Long-term Liabilities	\$ 10,587,500
Total Liabilities	\$ 772,000
Owner' Equity	\$ 3,308,000

Before Purchase		After Purchase	
Current Ratio	1	Current Ratio	0.97
Debt-to-Asset	0.78	Debt-to-Asset	0.79
Debt-to-Equity	3.63	Debt-to-Equity	3.67

Ratio benchmarks	Red	Yellow	Green
Current Ratio	<1.3	1.3-2.0	>2
D/A	>0.6	0.3-0.6	<0.3
D/E	>1.5	0.43-1.5	<0.43

<https://extension.umn.edu/farm-finance/ratios-and-measurements>

Beginning current ratio at warning level.
 Ending current ratio at warning level.
 Beginning Debt-to-Asset at warning level.
 Ending Debt-to-Asset at warning level.
 Beginning Debt-to-Equity at warning level.
 Ending Debt-to-Equity at warning level.

Figure 1. Screen capture of Heifer Purchase Financial Stress Analysis Tool

that feed and other costs are charged for the full year based on the number of heifers/cows at the start of the year. Total principal and interest are computed using the amount of the purchase financed, interest rate and term (years) assuming an amortized loan.

In the third block, users enter balance sheet information before heifers are purchased and financing obtained. Assets are on the left side and liabilities on the right side. The program computes the implied Owners' Equity.

The last block reports three financial ratios, current ratio (=current assets ÷ current liabilities), debt-to-asset ratio (=liabilities ÷ assets) and debt-to-equity ratio (liabilities ÷ owners' equity) both pre- and post-purchase. The macros then format these ratios using green, yellow and red backgrounds. A green background indicates the ratio is in a healthy range; a

yellow background indicates the ratio is in a warning range; and a red background indicates the ratio is a financially unhealthy range. Producers with ratios in yellow and red backgrounds should discuss the implications of a leverage heifer purchase with their banker before proceeding.

References

Bir, Courtney A., E. A. DeVuyst, M. Rolf, and D. Lalman, 2018. "Optimal Beef Cow Weights in the U.S. Southern Plains," *Journal of Agricultural and Resource Economics*, 43: 103-117.

Livestock Marketing Information Center. Member reports. <https://LMIC.info>. Accessed 07-April-2023.

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Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

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- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
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- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
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