



Managing for Today's Cattle Market and Beyond

Determining Your Unit Costs of Producing A Hundred Weight of Calf

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Unit Costs of Production

Astute beef cow producers are starting to recognize that more than just weaning weights are determining profits from beef cows. The maximum weaning weight formula pursued during the last cattle cycle focused around the belief that increased profits would follow increased weaning weights. It was thought that since heavier weaning weights implied more gross income, that heavier weaning weights also implied more profits. What was left out of the profit formula in the last cattle cycle was the fact that added weaning weight comes with added economic costs.

Statistical analysis of North Dakota's 1994 Integrated Resource Management (IRM) Cooperator herds suggests that only 20 percent of the herd to herd variation in unit cost of producing a hundred weight of calf can be explained by weaning weights. This, then, suggests that 80 percent of the herd to herd variation in unit costs of production has to be attributed to something other than weaning weights. Further analysis suggests that unit costs of production play a major role in determining beef cow profits. This all suggests that in this new cattle cycle, beef farmers and ranchers need to expand their management attention beyond weaning weights to also include their herd's unit cost of producing a hundred weight of calf.

Unit cost of production (UCOP) get its analytical power from the fact that 1) all production costs and 2) all units of physical production are taken into account.

Both production efficiency and economic efficiency are measured simultaneously by UCOP which is really an index of total costs divided by total units of production.

A rancher's first step in coping with today's low market prices is to *know* his herd's unit costs of producing a hundred weight of calf. His second step is to compare his herd's UCOP to benchmark herds' UCOP and find out if he is a low cost or high cost producer. The third step for a high cost producer is to use his unit costs of production to increase production and economic efficiency. The third step for a low cost producer is to ensure that he remains a low cost producer. A rancher's economic survival may well depend on his knowing and responding to his UCOP.

Divide Your Business Into Profit Centers

Rather than treating his farm or ranch business as one total business, it is recommend that a beef farmer or rancher divide his total farm or ranch business into appropriate profit centers and then treat each profit center as a stand-alone business. A typical beef farm or ranch could be divided into a beef cow profit center, a forage profit center, and a pasture profit center.

Make each profit center stand on its own with its own profit or loss statement. For example, pasture grazing should be priced to the beef cow profit center

at the going pasture rental rate and then the pasture profit center credited with the same pasture rent as income. Home grown forages fed to the beef cows should be priced into the beef cow profit center at the going market price (opportunity costs) and then credit your forage profit center with the market value of the forage fed. Now through the profit and loss statement for each profit center, this beef farmer or rancher will know where in his business he is making money and where in his business he is losing money. Once you have several years of profit or loss statements for each profit center, you will have a pretty good feel where you can increase profits or reduce losses in your beef farm or ranch business.

Calculating the Beef Herd's Costs of Production

The worksheet at the end of this fact sheet was designed to assist beef cow producers in determining their unit costs of producing calves. Producers should complete this worksheet using their last year's production and economic figures. The following discussion corresponds directly with each section on the accompanying worksheet.

In no way is this simplified manual worksheet designed to be a replacement for IRM-SPA¹ or IRM-FARMS² computerized analyses. It is hoped that this simplified worksheet will lead to more producers utilizing the more in-depth computerized analyses available from IRM-SPA and IRM-FARMS.

Section 1: Production Profile

The National Integrated Resource Management Standardized Performance Analysis (IRM-SPA) Guideline suggests that reproductive performance of a beef cow herd needs to be based on females exposed to the bulls. The percent calf crop (Item I, Section 1) is based on the females exposed (Item C, Section 1).³ The IRM-SPA Guideline allows producers to subtract out those females that were tagged to be culled before bull turnout. In addition, producers are to add in any bred females purchased or subtract out any bred/exposed females sold. Producers cannot subtract out cows that died, cows culled because of poor performance nor cows culled because they are open. You also can not subtract out cows culled because of light weight calves. The new number is referred to as *SPA Adjusted Females Exposed*.⁴

Section 2: Gross Income

A beef cow profit center generates both cash and non-cash income, both of which have to be taken into account when preparing an economic analysis of the beef cow profit center. The cash income is most readily identifiable as it related to the cash generated at sale time. Economic value of the cull cows is the capital gains. Capital gains is the difference between the book value (purchase price minus depreciation taken to date) and the selling value of the cull cow.⁵ Capital gains can be positive or negative.

Since a beef cow profit center generates joint products — steer calves, heifer calves, cull cows, cull open heifers, cull bulls — calculating costs per hundred weight of calves produced can get to be difficult. This author's recommended procedure for handling this "joint product" problem is to convert all income from the five different products into the equivalent hundred weights of income from steer calves (Item 9, Section 2).⁶ The hundredweight of steer equivalents is calculated by taking the combined gross income from all five products (Item 8, Section 2) and dividing it by the price of steer calves (found in line 1, Section 2). For example, if the total income is \$400 per cow and the price of steer calves is \$68, then this \$400 income is equivalent to the income from 5.88 hundred weights of steer calves. Unit costs of production are then calculated off of the 5.88 hundred weights of steer equivalents.

Section 3: Feed Cost

The National IRM-SPA Guideline suggests that an economic analyses of a beef cow profit center should value farm raised feeds fed at fair market value (opportunity costs). This suggests that if your neighbor would of have paid \$50 a ton for the hay fed to your cows, than your own cows should also pay \$50 for that hay.

Pasture land is to be charged to your beef cows at the going rental rates. This means that both deeded pasture land and rented pasture land should be charged in at the same rental rate. Public land should be priced in at the actual cash cost.

Total feed costs per hundred weight of calf sold is calculated by taking the total feed costs per cow (Item 16a) and dividing by the hundred weights of steer equivalents (Item 9).

Section 4: Livestock Costs

The only expenses that should be charged to the

Section 5: Overhead Costs

beef cow profit center are those expenses directly associated with the operation of the beef cow profit center (e.g., feeding, checking pastures, pumping water, veterinarian, etc.). It must be remembered, however, that when farm raised feeds are priced to the beef cows at fair market value, farming machinery, equipment and production expenses for farm raised feeds (e.g., fuel, repairs, maintenance) cannot be charged to the beef profit center.

The growing cost of replacement heifers covers the cost of growing and breeding replacement heifers from weaned calves until put in the main herd at pregnancy check time. The market value of the weaned heifer calf is not directly included because heifers, held back for replacements, were not valued in the gross income (Section 2).⁷ Heifer growing cost is prorated out to all cows in the herd by taking the heifer growing costs times the replacement rate of the herd. If it costs \$300 to grow the replacement heifer and your replacement rate is 15 percent, this prorates out a heifer replacement cost of \$45 per cow (0.15 x \$300).

Interest on borrowed capital should cover interest paid for breeding herd debt, building debt used by beef cows only, equipment debt used only by the beef cows. Interest should not include farm land debt nor farming machinery debt. Pasture land debt interest is separated out and put on its own line in Section 4 to emphasize that, if pasture is charged at going rental rates, that pasture debt interest, is also *not* part of the economic costs of the beef cow herd (see Item 25) .

The bottom of the Livestock Costs section (Section 4) is used to present a *direct cost summary* of feed costs plus livestock costs.⁸

Overhead costs are those asset costs directly associated with the breeding herd. A common error that beef farmers and ranchers tend to commit, when dealing with the profit center concept, is that they want to charge all of their farming overhead costs (including machinery investment) to the beef cow profit center. Charging farming costs to the beef cow profit center can easily lead to double accounting when farm raised feeds are also charged in at fair market value.

In order to keep the calculation of overhead costs as simple as possible, overhead costs are estimated with some general farm management thumb rules. Thumb rules for depreciation, insurance, repairs, taxes, and interest (the *DIRTI-Five*) are presented in Table 1. The *DIRTI* factor for buildings is figured by depreciation at 5%, insurance at 1%, repairs at 2%, property Taxes at 0% (North Dakota does not have a property tax but some states do), and Interest at 0%. Interest in the generalized *DIRTI-Five* is set to one-half of the going interest rate to adjust for the fact that market value of assets depreciate.⁹ Interest is set to zero in this specific analysis because return on equity capital is part of the residual claimant in the bottom line of this economic analysis. The *DIRTI-five* for buildings (excluding Interest) in North Dakota totals 7%. Due to property taxes, your state's *DIRTI-Five* for buildings could be higher.

The *DIRTI-Five* for equipment in North Dakota is depreciated at 10%, insurance at 1%, repairs at 2%, taxes at 0%, and interest at 0% for a total of 13% (plus your property tax percentage in your state). The *DIRTI-Five* for equipment(excluding interest) in North Dakota totals 13%. Overhead costs on the

Table 1. DIRTI Factors For Capital Asset Costs (North Dakota)

	Buildings		Equipment		Cows	
	Ours	Yours	Ours	Yours	Ours	Yours
Depreciation.....	5%	_____	10%	_____	--	_____
Interest	5.5%	_____	5%	_____	10%	_____
Repairs	1%	_____	2%	_____	--	_____
Taxes_1/_2/	__%	_____	__%	_____	__%	_____
Insurance.....	1%	_____	1%	_____	1%	_____
DIRTI Factor.....	12%	_____%	18%	_____%	11%	_____%
Excluding Interest.....	7%	_____%	13%	_____%	1%	_____%

_1/ Land taxes are changed to the crop/pasture profit centers and not to the cow herd.
 _2/ Property taxes vary from state to state so this number is left blank for users of this form to enter in thier own property tax numbers.

breeding cows covers a 1% insurance charge on the investment value of the breeding herd. Your state's numbers may be slightly different if your state has a property tax on building and/or equipment.

Section 6: Unit Cost Of Production Summary

The unit cost of production summary presents the income and costs summarized on a per cow and on a per hundred weight of calf produced (steer equivalent) basis. *Earned returns per cow* is used to measure the beef farm or ranch family's earned returns to unpaid family and operator and labor, management, and equity capital. The per hundred weight column presents the *unit cost of producing* a hundred weight of calves. Unit cost of production becomes your break-even cost of producing a hundred weight of calves.

Are You A Low Cost or High Cost Producer?

You are now able to compare your unit cost of producing a hundred weight of calf with the average unit cost of production on a set of benchmark herds. The three benchmark herd averages presented in Table 2 are for the 1994 calf crop produced by North Dakota Integrated Resource Management (IRM) Cooperators. These North Plains Benchmark Herds were used to construct the UCOP barometer presented in Table 2.

The Benchmark Herds were divided into three groups based on unit costs of producing a hundred weight of calf. The low cost number presents the average of the low cost 1/3 of the benchmark herds and the high cost number presents the average of the high cost 1/3 of the benchmark herds. The average costs come from all of the Benchmark herds. Keep in mind that these are the three groups' averages. The range in the average groups' costs of production is extremely wide (\$41 to \$91 per cwt of calf produced), however, the individual herds' unit costs of production was even wider —ranging from a low of \$40 to a high of 129\$ per hundredweight of calf produced.

¹ Integrated Resource Management Standardized Performance Analysis typically available through your State's Cooperative Extension Service and/or NCBA.

² Integrated Resource Management Financial And Reproductive Management System available through North Dakota State University Extension Service.

³ A worksheet for calculating SPA Adjusted Females is available from Extension Economics Section; Department Of Agricultural Economics; North Dakota

State University; Fargo, North Dakota 58105 or phone 701-231-7393.

⁴ A form for calculating SPA adjusted females exposed is available from this author at 701-231-9393, ask for Norma.

⁵ Since raised cow are on the depreciation schedule at zero value, the capital gains of raised cull cows equals the sales barn dollars generated.

⁶ The IRM-SPA Guideline recommends an alternative to the steer equivalent approach. It recommends that the joint products be handled by subtracting the non-calf income from total costs with the remaining costs attributed to the pounds of calf produced. The assumption here is that the non-calf income just equals the non-calf costs. This fact sheet, however was designed around the Steer Equivalent approach. One major advantage of this steer equivalent technique is that this unit cost of production can be directly compared to the market price of steer calves. This direct comparison facilitates marketing in that steer market price and UCOP are in the same units.

⁷ The true opportunity cost of a replacement heifer is the sum of the market value of the heifer calf held back plus the cost of growing and breeding that heifer. Interest cost on the value of the initial heifer calf for two years should also be included.

⁸ Item 26a is calculated by taking gross income per cow (Item 8) and subtracting total feed costs per cow (Item 16A) and subtracting livestock costs (Item 26). The break-even market price to cover direct costs (feed costs plus livestock costs), Item 26B, is calculated by summing feed costs (Item 16A) plus total livestock costs (Item 26) and dividing by the total hundred weights of steer equivalents (Item 9).

⁹ Interest cost is frequently figured by using an average investment figure (purchase costs +salvage value) divided by 2 time interest rate. Instead, this was simplified by divining interest into one-half.

Table 2. Unit Costs Of Producing A Hundred Weight Of Calf_1/ Based On Economic Analysis For Your Beef Cow Profit Center

\$49.00	\$67.00	\$91.00
low costs	average costs	high costs

¹/ The Unit costs of production range presented are the averages for the low cost 1/3, average of all herd, and the average for the high cost 1/3 North Dakota herds producing 1994 calves.

Place your unit costs of production in its appropriate place on the cost barometer in Table 2 and answer the following question: ***I am a (low, Ave or High) _____ cost producer.***

Section 1: Production Profile

A. Jan. 1 Number Of Beef Cows.....	=	_____	Head
B. Jan. 1 Inventory Of Replacement Heifer Calves.....	=	_____	Head
C. SPA Adjusted Females Exposed To Bull Last Year.....	=	_____	Head
D. Live Calves Born	=	_____	Head
E. Live Calves Weaned_____ Steers, _____ Heifers _____ Bulls	=	_____	Head
F. Number Of Cows Replaced	=	_____	Head
G. Number Of Cows That Died	=	_____	Head
H. Calves That Died	=	_____	Head
I. Percent Calf Crop(E/C) x 100	=	_____	%
J. Replacement Rate(F/A).....	=	_____	%
K. Cow Death Loss(G/A)	=	_____	%
L. Calf Death Loss(E/D)	=	_____	%

Section 2: Gross Income

Herd #	Ave Wt	Amount	Units	Price	Total
1. Steer Calves	_____	_____	_____ Lbs	\$_____	\$_____
2. Heifer Calves ..	_____	_____	_____ Lbs	\$_____	\$_____
3. Cull Cows	_____	_____	_____ Lbs	\$_____	\$_____
4. Cull Rpl Hfrs ..	_____	_____	_____ Lbs	\$_____	\$_____
5. Cull Bulls	_____	_____	_____ Lbs	\$_____	\$_____
6. Inventory change	Beginning \$_____	Ending \$_____			Change = \$_____
7. TOTAL GROSS INCOME.....					\$_____
8. GROSS INCOME PER COW (Item 7/ Item A).....					\$_____
9. TOTAL INCOME/COW IS EQUAL TO HOW MANY CWTS OF STEER INCOME? \$_____					9a. PRICE RECEIVED PER HUNDRED WEIGHT OF STEER CALF SOLD \$_____

Section 3: Feed Cost

	Per Cow		Per Cwt
12. Pasture — Going Rent	_____ A/Cow @	\$_____/A = \$_____	
12a. Public Land Payment.....	\$_____/Herd.../	_____ Cows = \$_____	
12b. After Math Grassing.....	\$_____/Hd Da x	_____ Hd Da = \$_____	
13. Pasture Maintenance	\$_____/Hd Da x.	_____ A/Cow = \$_____	
14. Hay	_____ Tons@	\$_____ = \$_____	
15. Grain	_____ /Bu @	\$_____ = \$_____	
16. Salt & Mineral	_____ Lbs@	\$_____ = \$_____	
16A. TOTAL FEED COSTS		\$_____	
16B. TOTAL FEED COSTS PER HUNDRED WEIGHT OF CALF SOLD.....		\$_____	

Section 4: Livestock Costs

		Per Head	Per Cwt
17. Vet & Medicine	\$_____/Hd.....	\$_____	
18. Breeding	\$_____/Hd.....	\$_____	
19. Marketing	\$_____/Hd.....	\$_____	
20. Growing Costs Of Rpl Heifer	_____%/Cow @ \$_____/Hd =	\$_____	
21. Mach & Equip (Fuel,Rep& Maint)	\$_____/Hd	\$_____	
22. Other	\$_____/Hd	\$_____	
23. Interest On Operating Capital	\$_____/Cow @ _____%	\$_____	
24. Interest On borrowed Capital (Cows, Building, & Equipment)		\$_____	
25. Interest On Pasture Land Money Borrowed	\$_____	\$xxxxxx	
26. TOTAL LIVESTOCK COSTS (\$/COW)		\$_____	\$_____
<hr style="border-top: 1px dashed black;"/>			
26a. RETURNS ABOVE FEED AND LIVESTOCK COSTS (\$/COW).....		\$_____	\$_____
26b. BREAK-EVEN PRICE PER CWT TO COVER DIRECT COSTS		\$_____	\$_____

Section 5: Overhead Costs

				Per Cow	Per Cwt
27. Breeding Herd Investment.....	\$_____/Herd	@	1.0 %	\$_____	
28. Buildings (Beef Cows Only)	\$_____/Herd	@	____%	\$_____	
29. Equipment (Beef Cows Only)	\$_____/Herd	@	____%	\$_____	
30 . TOTAL OVERHEAD COSTS				\$_____	\$_____

Section 6: Unit Cost Of Production Summary

	Per Cow	Per Cwt
31. Total Income	\$_____	\$_____
32. Total Costs.....	\$_____	\$_____
33. Returns to Unpaid Operator Labor, Managment, & Equity Capital.....	\$_____	\$_____
34. Beak-Even Price/CWT of Calf Sold to Cover All Costs_2/	\$_____	
2/ Break-Eeven = (total costs/cow,[32])/wts of Steer Equivalent Income, [9])		\$_____