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Calculating Unit Costs of Production and Using the Information for  
Enterprise Analysis and Decision Making on the Ranch  
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## **INTRODUCTION**

Unit Cost of Production (UCOP) and Enterprise Analysis are tools that ranch managers have been encouraged to utilize in making decisions to improve profit. Managers who have adopted these tools have found them to be valuable in identifying opportunities and problem areas in enterprises on the ranch.

### **HISTORY OF THE DEVELOPMENT OF UNIT COSTS OF PRODUCTION FOR USE IN RANCH MANAGEMENT DECISIONS**

The late 1970s and 1980s were challenging times financially for farm and ranch businesses, forcing many to exit the industry. In the early 1990s, the National Cattlemen's Association Integrated Resource Management (IRM) subcommittee developed Standardized Performance Analysis (SPA), which was based on production and economic measures. The SPA analysis was designed in relation to the guidelines of the Farm Financial Standard's Task Force for agriculture, with the overall goal of helping ranchers to utilize and understand financial records in the management of their operations. A number of agricultural economists in Cooperative Extension such as Dr. Jim McGrann Ph.D., Texas A&M and Dr. Harlan Hughes Ph.D., North Dakota State University, were foundational in developing financial and production record keeping methods as well as software for producers to use in the analysis of their businesses.

### **THE USE OF UNIT COST OF PRODUCTION AND ENTERPRISE ANALYSIS IS IMPORTANT TO LONG TERM RANCH BUSINESS SUCCESS**

The old adage "you can't manage what you don't measure" is still true in relation to managing the ranch business. Knowing UCOP and the economic contribution of each enterprise on the ranch are foundational tools for making effective decisions in the management of ranch resources. However, a critical first step in calculating UCOP is to actually have production and financial records. These records do not have to be complicated, but they must be accurate and thorough. Records also need to allow for the allocation of expenses to different enterprises within the ranch. Many computerized financial record keeping programs are designed to easily track and allocate expense within enterprises.

## WHAT IS UNIT COST OF PRODUCTION AND HOW IS IT CALCULATED?

Simply put, Unit Cost of Production is a ratio of total costs divided by total product produced. In the case of cow-calf production, it would be represented by the following:

$$\text{UCOP} = \frac{\text{Cow-calf Production Costs}}{\text{Total Pounds Produced}}$$

The real power of the UCOP ratio is that everything involved in the production of a pound of calf is represented either in the numerator or denominator of the equation. For example, if a producer wants to buy a new pickup that will be used in the production of calves, he can estimate how the purchase of that new pickup will affect his UCOP in terms of cost per pound of calf produced.

The Unit Cost of Production ratio can be applied to other enterprises on the ranch as well. For example, if a producer is considering growing his calves and marketing them as yearlings instead of selling at weaning, knowing his cost to produce a pound of gain on those calves is important in evaluating those options. The same thing applies to the harvest of hay. Knowing all expenses involved in growing and harvesting a ton of hay can give insight into whether or not the haying enterprise is profitable.

## ENTERPRISE ANALYSIS

It can be very challenging to evaluate ways to improve a ranch's profitability without conducting an enterprise analysis. If a ranch's financials basically consist of a year-end financial statement prepared for tax purposes, knowing where to make changes to improve profit can be difficult, especially if that ranch business is made up of several different enterprises.

For example, let's take a northwest Nebraska ranch run on owned land, has a cow-calf operation, runs their calves over as yearlings, and also puts up hay. The major product this ranch markets every year is yearling steers. However, this ranch also markets open heifers, heiferettes, bred heifers, cull cows, bred cows and cull bulls. What are the different enterprises on this ranch? Which enterprises in this ranch are profitable and which ones are just breaking even or losing money? With only the information from a year-end financial statement for a tax return, it is nearly impossible to know.

For the sake of this example, let's break this ranch into the major enterprises or businesses.

1. Land
2. Cow-calf
3. Stocker/Yearling
4. Heifer Development
5. Hay

The first enterprise, land, is often overlooked when evaluating the ranch as a whole. This is especially true if the ranch is owned. On paper, the land business should be a separate enterprise for which the other enterprises pay the equivalent of a fair market value lease rate. The cow-calf, stocker/yearling, heifer development, and hay business all need to pay the land business for the use of the land. All the costs associated with the land business need to be allocated to that enterprise. Even though this "paying" of the land business occurs only on paper with records utilized within the ranch, it allows the ranch manager to accurately analyze the profitability of and returns to the land business. By treating the five major enterprises on the ranch as individual businesses and having them "pay" a fair market value rate as resources are utilized or moved between enterprises, the manager can accurately see where costs occur and revenue is generated.

One of the challenges producers frequently cite when discussing separating the ranch into enterprises is the difficulty in knowing how to break out expenses. For example, the tractor used to pull the baler to put up hay is also used to feed hay in the cow-calf, stocker/yearling, and heifer development enterprises. How should expenses related to that tractor be allocated? In working with producers, I encourage them to initially make their best guess as to the amount of time a piece of equipment is used within a respective enterprise and then break out related expenses accordingly. Initially, the goal is to get close and provide a figure that will allow for a reasonably accurate enterprise analysis. In subsequent years, simple records such as the number of hours the tractor has at the start and end of haying season can be used to refine these numbers.

### **THE RISK OF COST ALLOCATION**

When allocating expenses, a risk a ranch manager should be aware of is that the elimination of an enterprise won't always remove all the associated costs involved with that enterprise. Let's say the manager of our previous example is tired of putting up hay and wants to see what the ranch might look like financially if he grazed his meadows and purchased hay. Discontinuing the hay operation will not stop all the costs associated with that enterprise, since the tractor used in harvesting hay is also used in feeding hay. The taxes, insurance, depreciation, repairs, and any interest on money owed on the tractor must now be paid entirely by the other ranch enterprises that use the tractor. Eliminating the haying enterprise,

which would reduce the hours the tractor is used, will actually raise overall tractor expense related to the cow-calf and stocker/yearling enterprises as they are now responsible for all tractor related expenses. Evaluating the potential ripple effects of individual decisions across all other enterprises is an important consideration.

### **THE USE OF UNIT COST OF PRODUCTION AND ENTERPRISE ANALYSIS ON RANCHES TODAY**

The consensus among ranchers, agricultural lenders and agricultural economists is that the adoption of these tools within ranching has been relatively slow. Only a small percentage of ranch managers are actively utilizing UCOP and enterprise analysis or are using managerial accounting that includes cost and profit centers in their operations today. What is the reason for such slow adoption of these tools at the ranch level? First, most ranch managers/owners were likely trained in production and enjoy that part of the business the most. Along with that is the subconscious perception that the one who produces the best cattle should be the most profitable. Thus the production side of the business is what captures a majority of their focus, time and energy. Second, many find record keeping and data collection to be something that easily gets forgotten in the course of daily business operations and thus they fail to have what is needed at year end. Third, many producers are overwhelmed by the task of pulling data together and getting it into a form that can be understood and used to make decisions. Therefore the process is often viewed as something that is important that “should get done” but remains off in the future, to be completed “sometime.”

Although producers may not enjoy financial analysis tasks, the pay off per hour invested can be enormous. When the UCOP and enterprise analysis are complete, it is not uncommon to find that one or more enterprises on a ranch are consistently losing money. It is ironic that a producer may be investing hundreds of hours of time and large amounts of money year after year in an enterprise that consistently loses money, but they are not willing to invest several hours each year to analyze enterprises on the ranch. This is a task that should be near the top of the list in terms of importance to the overall success of the ranch.

### **THE IMPORTANCE OF USE OF UNIT COST OF PRODUCTION FOR RISK MANAGEMENT**

The volatility in commodity markets today creates both challenges and opportunities for ranch managers as they try to limit increases in input costs while seeking to consistently capture the greatest profit from the cattle they produce. There are a number of different risk management tools and options available to producers today. A ranch manager, who knows their unit cost of production, has greater confidence in utilizing market risk management tools to protect profit.

## **WHO CAN HELP ME PERFORM A UCOP AND ENTERPRISE ANALYSIS?**

If you have never performed a UCOP analysis on your cow-calf enterprise or broke the ranch into different enterprises, it can seem overwhelming. However, like most things in life, the more you work at something, the easier it gets. Ranchers who participate in one of the several Ranch Management Practicum schools offered in this region receive in-depth education and practice in conducting UCOP and Enterprise Analysis. These schools recently received a significant grant and will be offering scholarships to producers to attend the course. Information can be found at <http://RanchPracticum.com>.

University of Wyoming Extension Educator Dallas Mount and I are willing to work with producers on a one-on-one basis to help them calculate UCOP numbers for their cow-calf enterprise as well as other enterprises on their ranch. If you are familiar with the use of Excel<sup>®</sup> spreadsheets, Dallas has developed spreadsheets that are available on the web at <http://hpranchpracticum.com>. These spreadsheets use the information and formats developed by Dr. Harlan Hughes and have put them into forms that can be easily used in Excel<sup>®</sup>. Also at the High Plains Ranch Practicum website are sample ranches that have UCOP numbers calculated for them, as well as instructional videos that can help producers walk through the process. Obviously, Dallas and I aren't the only ones who can help you with this as there are additional Extension personnel and programs available to assist producers in the process of being able to calculate UCOP and perform enterprise analysis. One such excellent resource is North Dakota State University's Cow Herd Appraisal Performance Software (CHAPS) program. More information on the CHAPS program is available at <http://www.chaps2000.org/>.

## **THE POWER OF BENCHMARKING**

Once a ranch manager has taken the time to learn how to calculate UCOP numbers and is confident in the accuracy of those numbers, it is time to examine where changes might be made to better meet desired management goals. This involves examining both input costs and production numbers and comparing them to some industry standard numbers or benchmarks. Perhaps one of the most valuable parts of enterprise analysis is the ability to benchmark UCOP numbers against other businesses with similar enterprises. Accurately comparing production values and costs against others gives the opportunity to identify competitive advantages as well as problem areas where adjustments could be made. Successful athletic teams are constantly comparing themselves to the best and looking at the statistics and strategies of other successful programs to see how they might be more competitive. For ranch managers, UCOP numbers are the "statistics" that allow them to

compare themselves to others and then make adjustments that will enhance their ability to meet their business and personal goals. As a manager thinks through possible management changes, utilizing a team approach to receive input on the proposed changes can be beneficial. This team could include extension personnel, veterinarians, economists, animal scientists, range scientists, and other successful ranchers. Benchmark numbers based on recently conducted UCOP analysis are available at the High Plains Ranch Practicum website <http://hpranchpracticum.com/> and the CHAPS website <http://www.chaps2000.org/>. Producers can compare their own production and financial numbers to these benchmarks.

### **CAUTIONS WITH BENCHMARKING**

There are two principles producers should be aware of when utilizing benchmarks and comparing them to their own operation. The first is to compare production and cost calculation numbers to others who have calculated their numbers in the same way. A data set that has a history and uniform method for calculating numbers can help insure the benchmark figures are accurate. The second principle is to compare your numbers to ranches with similar resources and in the same region. It can be valuable to see what those numbers are for other parts of the country, but comparing your numbers to others with a similar set of circumstances is going to be the most helpful.

At the end of this paper (Table 1) is a one page sample UCOP calculation for a cow-calf enterprise in Western Nebraska on a per cow basis. If a producer has never analyzed the costs involved with the cow-calf enterprise in their operation, I find that having them compare their own expenses to these numbers can be an eye opening experience.

### **USING THE INFORMATION TO DRIVE WHERE YOU WANT TO GO**

The rearview mirror in a pickup is helpful because it lets you see what is behind you, but if your entire focus when you are driving is in the rearview mirror, you are likely going to end up in the ditch. Obviously when you are driving, the majority of your time needs to be spent looking ahead, through the windshield, focusing on where you want to go. The same is true when knowing and using UCOP numbers. We can do nothing about the past when we look at UCOP values as well as production and cost numbers. These only tell us about what has happened. However, there is tremendous power in using these values along with current information to plan, project, and make decisions that will continue to move the operation toward desired goals.

## **SUMMARY**

Unit Costs of Production is the one ratio that takes into account both product produced and input costs. Knowing UCOP allows a manager to look forward utilizing both present and projected input costs as well as production numbers to make informed decisions. Ranch managers who know the UCOP numbers for ranch enterprises and understand the interaction between input costs and production are able to implement strategies to help them effectively manage resources to meet both business and personal goals.

**Table 1. Neb. Panhandle Est. Costs/Calf Produced. Mar/April Calve, Wean Nov 20% of Heifers Retained as Replacements. 2-Yr-Old Heifers Calving Feb. 10.**

<b>Mature Cows Feed Costs</b>	<b>Quantity</b>	<b>Price</b>	<b>Cost/Cow</b>
Crop Residue Nov 1 - Feb 28	4 Mths	\$15	\$60.00
Protein Supplement Jan 1 - Feb 28 alf. hay	200 lbs	\$150/T	\$15.00
Pasture Mar 1 - May 15 (For Calving/Pairs)	2.5 Mths	\$5	\$12.50
Alfalfa and Grass/Millet/Sorg. Sudan Hay	1.2 Ton	\$120/T	\$144.00
Pasture May 15 - Oct 31	5.5 Mths	\$28	\$154.00
Salt and Mineral for 12 Months	70 lbs	\$.20/lb	\$14.00
<b>Total</b>			<b>\$399.50</b>
<b>Two-Yr-Old Heifers Feed Costs 16% of the Herd</b>			
Crop Residue Nov 1 - Feb 1	3 Mths	\$15	\$45.00
Protein Supplement Dec 15 - Feb 1 (alfalfa)	250 lbs	\$150/T	\$18.75
Pasture Feb 1 - May 15 (For Calving/Pairs)	3.5 Mths	\$5	\$17.50
Alfalfa and Grass Hay (Millet, Sorghum-	1.7 ton	\$120/T	\$204.00
Pasture May 15 - Oct 31	5.5 Mths	\$28	\$154.00
Salt and Mineral for 12 Months	70 lbs	\$.20/lb	\$14.00
<b>Total</b>			<b>\$453.25</b>
<b>Replacement Heifers 20% Replacement</b>			
Crop Residue/Alfalfa Aftermath Nov 1 - Feb	3.5 Mths	\$10	\$35.00
Protein Supplement Dec 15 - Feb 15	300 lbs	\$150/T	\$22.50
Growing Ration Dry Lot Feb 15 - May 15	3 Mths	\$45	\$135.00
Pasture May 15 - Oct 31	5.5 Mths	\$20	\$110.00
Salt and Mineral for 12 Months	45 lbs	\$.20/lb	\$9.00
<b>Total</b>			<b>\$311.50</b>
<b>Estimated Annual Bull Feed Costs</b>			<b>\$400.00</b>
<b>Feed Costs per Cow Unit Includes Bulls, 2-Yr-Olds &amp; Rep. Heifers</b>			<b>\$490.39</b>
<b>Total Other Cash Costs Vet. Med. Bldngs. Equip. Mrkting. Int. Etc.</b>			<b>\$70.00</b>
<b>Labor</b>	5 hours/yr	\$15.00/hr	<b>\$75.00</b>
<b>Total Operating Costs</b>			<b>\$635.39</b>
<b>Ownership Costs</b>			
Int. on Cattle Value (Ave. Val. Over Life)	\$1050	4.0%	\$42.00
Purchase of bull every 4 years for 25 cows	\$4000/100		\$40.00
Taxes and Insurance Buildings and Equip.			\$10.00
Equipment and Facilities Depreciation			\$20.00
<b>Total Ownership Costs</b>			<b>\$112.00</b>
<b>Total Costs Excluding Cull Credits</b>			<b>\$747.39</b>
<b>Cull Credits</b>			
Cull cow - death loss (0.16-0.015 = 0.145)	1250 lbs	\$0.60	\$108.75
Cull heifer - death loss (0.04-0.003 = 0.037)	850 lbs	\$1.25	\$39.31
Cull bull - death loss (0.01 - 0.0005 = .0095)	1800 lbs	\$0.70	\$11.97
<b>Total Cull Credits</b>			<b>\$160.03</b>
<b>Capital Cost of Rep. Heifer Calf at</b>	20% Rep. Rate	\$850	<b>\$170.00</b>
<b>Net Capital Cost</b>			<b>\$9.97</b>
<b>Net Cost Per Cow</b>			<b>\$757.36</b>

**Cost/calf weaned/cow exposed at 80%=\$946.70, 85%=\$891.01, 90%=\$841.50**