HPM - Producer Enterprise Budget Exercise

Purpose: To develop your skills and knowledge to:
- Understand the major cost and income components and the **unit cost of production (UCOP)** (e.g., hundredweight of milk or of weaned calf) per production unit (e.g. cow) for the major livestock enterprise of your clientele.
- Know the important input (e.g., fuel, feedstuffs, fertilizer, replacements) and output (e.g. milk, calves, culls) prices, to begin tracking these, and to be aware of their trends
- Know the major costs of a production system ("the big picture"), common performance benchmarks, and be able to identify those in a specific herd that make it a low or high cost producer.
- Provide producers quantitative information on the economic benefits as well as costs of herd programs and their alternatives (e.g. routine vaccination and deworming, cow-calf pregnancy checking, annual bull BSE's, BioPRYN vs. rectal palpations).
- Explain the economics behind choices for common individual interventions (e.g., therapeutic choices, DA surgery vs. roll-and-tack, C-section vs. fetotomy, treat vs. cull)
- Explain the economics behind choices for common herd interventions and policies (e.g., breeding strategies and policies, culling policies, and disease elimination vs. control vs. prevention strategies)Evaluate the tradeoffs between product quality bonuses and production costs
- Understand **cash accounting** vs. **accrual accounting** and interpret the basic financial reports (e.g. **balance sheet, income statement, owner equity, cash flow**) and financial measurements and ratios
- Understand the concept of enterprises and **enterprise budgeting**, particularly for livestock enterprises (Olson chap 15)
- Apply the principles of **variable cost**, **marginal cost**, **marginal return** and **marginal production** versus **fixed cost, average cost, sunk cost, average return,** and **average production** and to avoid using the wrong values (Olson chap 4, Fetrow, Galligan, Lawrence)
- Calculate or estimate the values needed for **partial budgeting** (Olson chap. 16)
- Perform **cost-benefit analysis** of interventions for increasing the number of units produced, for increasing the produced unit's value, or for reducing input costs.
- Create a tool that you can use to do "what if's" for marketing, for evaluating risk (e.g., market price drops 10%, an abortifaceant strikes unvaccinated cows) and for changes in these preventive programs.
- Identify the "bottlenecks" limiting the economic performance of a specific herd.
- Use spreadsheets effectively to analyze herd data and to present the results to decision makers
- Be familiar with the wide range of online information that is relevant to these analyses

Understanding the costs and returns in an enterprise budget is the first step to performing cost-benefit analyses for determining the economic value of veterinary interventions and procedures and for decision analysis of alternatives.

Task: Build a new or modify an existing livestock enterprise budget spreadsheet in Excel, Google Drive, Apache OpenOffice, or Libre Open Office**, or other for doing "what if's" on veterinary preventive programs**
- Make this spreadsheet as simple or as complex as you like; the most important thing is not to fool yourself with the conclusions from it
- You may work in groups of students with similar species interests but everyone should complete their own final version
- If you need a quick Excel tutorial, a Google search using the key words "excel tutorial" yields a bunch (800,000+ hits), one of which should be to your liking. Examples of two quick basic tutorials for Excel 2010 are pdf1 and pdf2
- To reduce your search time:

o   I've listed on-line versions of much of the information you need to build your spreadsheet and various guides. Use these as guides only and verify with your own data and calculations

o   The VM 577P class folder contains many enterprise budget spreadsheet examples and some examples of previous classes work. These resources have not been checked, corrected, edited, approved of, or selected as examples, good or bad, in any way

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off-campus - https://cvmdata.vetmed.wsu.edu/Shared/VM577HPM (authorization required)

Livestock Enterprise Budget Spreadsheet

Goal: Create a new or modify an existing livestock enterprise budget spreadsheet to calculate annual costs and returns per production unit (e.g., calved beef cow or dairy cow) and per unit of production (e.g., hundredweight of milk or weaned calf), with professional veterinary service fees broken out from pharmaceuticals, biologicals and so on.

Background:

Enterprise accounting is a method for determining if each "profit center" (e.g., producer herd, replacement rearing, crop production) of a farm is profitable on its own. It treats each major farm section, such as crop production and replacement rearing as well as the primary product production (milk in the case of dairy farms or calves in the case of beef cow-calf herds) as separate, standalone enterprises. If a market exists for anything transferred between these within-farm enterprises, then a producer could specialize in an enterprise, such as only raising crops or only raising replacements, rather than having an integrated operation doing all these things. In an integrated operation, the crops are "sold" at local market price within the farm to the livestock enterprises and heifer calves are "sold" at local market price from the mature herd enterprise to the replacement rearing enterprise. The idea is that if one enterprise isn't profitable at least on paper when "buying" inputs from and "selling" outputs to the other integrated farm enterprises at local market prices, then the producer is likely better off closing down the unprofitable enterprises, expanding the profitable enterprises and buying those inputs, such as feed, from other producers or custom operators. Isolating those enterprises with which you as an ag animal veterinarian are concerned from those that you are not is critical.

A unit of production is typically a hundred weight (cwt) of milk or feeder calf. The **unit cost of production** (**UCOP**), the cost of producing a unit of production, **is the single most important summary measure a producer (and you) can use as a basis for making decisions**. For producers of commodities, such as milk or feeder calves, selling into a cyclical market **for long term survival an important goal is to have a UCOP that is equal to or below the median value for the industry**. Because the unit cost of production captures both the production and economic efficiency of an operation, it is a good measure for making benchmark comparisons between operations and for determining if a particular practice, such as adopting a new vaccine, is economically beneficial. If it lowers the producer's long run UCOP, it is beneficial. If it doesn't, it isn't. If a producer's UCOP is high relative to market price or above the median benchmark for the industry, the next step is to determine why and to do "what if" scenarios for either reducing it, weathering the period of low price for an upturn, or increasing the value of the product.

As well as operating costs per UCOP, you should also know the typical capital, facility, equipment and purchased inventory (e.g., purchased feeds) investment per UCOP and per production unit and how these compare to industry benchmarks. Note that the Iowa enterprise budgets are per production unit.

Enterprise budgets provide estimates of the farm-origin values needed for partial budgeting (pdf), establishing opportunity costs, and performing cost-benefit analyses of alternatives, several techniques in the business decision analysis tool kit. Many formal decision making techniques, such as analytic hierarchy process, are available for making complex business in the face of uncertainty.

Procedure:

[Note: When you find a useful on-line material, save it to your system. About ⅓ disappear annually, some

permanently!]

1. For background, read material on production economics, enterprise accounting, decision making, the important measures and their benchmark values. Some print sources are:
   - How to Farm for Profit: Practical enterprise analysis (DM Fedie, 1997)
       Economic Assessment of Animal Health Performance. Galligan, D (2006). *Vet Clin NA Food Animal* 22(1):207-227.
   - "Economics" pgs 72-94 in: Slenning, B. Chap. 2: Quantitative Tools for Production-oriented Veterinarians in: Radostits OM (2001). Herd Health: Food Animal Production Medicine, 3rd ed.
   - "Livestock Production Economics" Chap 3, pgs. 16-45 in: J Rushton, ed. (2009). The Economics of Animal Health and Production.
   - Olson Economics of Farm Management in a Global Setting, particularly chapters 4, 15, and 16.

Marginal analysis materials:
   - **Marginal thinking: Making money on a dairy farm** (S Eicker, J Fetrow, S Stewart, 2006 – pdf)
   - The application of economics in animal health programmes: A practical guide (RS Morris, *Rev Sci tech* 18(2):305-314, pdf)
   - The economics of animal health in farmed livestock at the herd level (W Marsh, *Rev Sci Tech* 18(2):357-366, pdf)
   - **Economic principles in nutritional monitoring** (DT Galligan – pdf)
   - **Optimal marketing weight for fed cattle** (J Lawrence - pdf)
   - Marginal costs versus marginal returns: Why cutting costs is not always the answer (GE Dahl, DH Lattz, G Schnitkey, 2002)
   - Chap 7: Economic Analysis Tools, pgs. 65-106 in: J Rushton, ed. (2009). The Economics of Animal Health and Production.

UCOP specific:
   - Unit cost of production (UCOP) practicum - html in High Plains Ranch Practicum
   - Determining your unit costs of producing (UCOP) a hundred weight of calf (Harlan Hughes - U Wyoming site TOC pdf)
   - Be Safe: Get to know your UCOP (Gary Frank, Wisc CDP Production Costs – pdf)
   - Cost of Production (Ken Bolton, Gary Frank, Wisc CDP Production Costs – pdf   Babcock 1998 pdf)
   - Milk Production Costs: How much does it cost you to produce 100 lbs of milk? (Maryland 790 pdf)
   - 2008 Estimated Costs and Returns for a 150-Head Cow-calf to Grass-finished Beef Production System in the Channeled Scablands Range Area of East-central Washington - pdf
       (Page 14 has an error. The per head total returns were added instead of averaged so the Net Return per Head is wrong. The correct value is $105.06 or one fifth of the listed value, a huge difference. This was caught be a veterinarian (not me) and reported to the authors in 2010 but remains incorrect on-line. The lesson – be wary of errors and always check the calculations behind the numbers; this enterprise is not nearly as profitable as it appears at first glance!)

Additional on-line materials are:
   - Agricultural business management – financial statements (U Minn CFFM Financial Management Series #1 – pdf)
   - Farm Finance Scorecard (U Minn CFFM – pdf)
   - Farm Financial Ratios and Benchmarks (Wisc CDP - pdf)
   - Enterprise Accounting (GG Frank, 1997, pdf)
   - Dairy Excel's 15 Measures of Dairy Farm Competitiveness, 2008 (Ohio State Bulletin 864 - pdf)
   - U.S. Top Dairies: Benchmarks for Success (veterinary costs per cow are in table 4) (MW Stephenson, pdf)
   - Critical Control Points for Profitability in the Cow-Calf Enterprise, 2001 (AS R1750 Iowa State, pdf)

2. Identify a region in which you want to practice (cost structures differ geographically), define the primary type of livestock enterprise that you expect will be your clientele (e.g. commercial beef cow-calf, commercial dairy, registered beef, feedlot, registered dairy, small ruminant, swine). If this identity isn't on your spreadsheet, enter it as text at some point.

> I've located many of the on-line resources needed for constructing the spreadsheets for the first two types of operations (commercial cow-calf or dairy) but not for the rest. You are free to select any type of livestock enterprise but you will have to track down example enterprise budgets for them or to develop your own from scratch.

3. Find one or more livestock enterprise budgets and benchmarks for the type of operation and the approximate size (number of head) that apply to your selected region to serve as a model or to modify.

> Livestock Enterprise Budgets produced by Agricultural Extension Services provide midrange estimates of costs and revenues (the cost structure) for typical producers in their region. You can locate these using Google.com or Bing.com search terms "enterprise budget" with qualifier terms such as "livestock", "cow-calf", "dairy", "feedlot" or "swine" for species, "pdf" for reports or "xls" for spreadsheets, and a state abbreviation if you like:

General resources:
- U Minn Ag Risk Education Budget library - search   state websites
- Characteristics and Production Costs of U.S. Cow-Calf Operations (USDA ERS bulletin 974-3, 2001 pdf html - 1996 data - dated)
- Profits, Costs, and the Changing Structure of Dairy Farming (USDA ERS bulletin ERR-47, 2007 pdf - 2005 data)
- Using enterprise budgets to make decisions about your farm, PNW0535 pdf

Regional examples:
- California Current Cost and Return Studies – 300 head cow-calf pdf
- Colorado Livestock Enterprise Budgets (beef, sheep), Decision Tools (cow cost spreadsheet)
   - **Note:** Excellent veterinary cost breakdown
- Idaho Enterprise Budgets (beef, dairy, sheep, swine pdf & **xls**)
- Illinois FAST (Farm Analysis Solution Tools) - livestock
- Iowa Ag Decision Maker - Livestock Enterprise Budgets (swine, beef cow-calf, stocker, feedlot, dairy spreadsheets - combined pdf)
   - **Note:** Budgets are per production unit
- Kansas AgManager.info Decision Tools - livestock
- Manitoba Cost of Production (pdf and xls for cow-calf, dairy, feedlot, sheep, swine)
   - **Note:** complete breakout of veterinary costs
- Missouri Beef Resource Guide (extensive spreadsheet set) - File Sharing (**huge spreadsheet list**)
- Montana Farm Management Decision Support Software Downloads (livestock – spreadsheets & pdfs)
   - **Note** Cowcost, CCFS - Cost of Production Estimates for Commercial Cow Calf Enterprise
- Nevada pdf list – Elko Cow-Calf Costs, 2000 - pdf
- Ohio Farm Management Enterprise Budgets
- Oklahoma Livestock Enterprise Budgets (example reports for beef cow-calf, stocker – spreadsheets available for purchase)
- Oregon Livestock Enterprise Budgets - - (under the advanced search - mostly pdf's from the 90's)
   - **Note:** nice flow chart in 750 cow-calf enterprise budget, 1998 – pdf
- Texas Extension Cow-calf Budgets - Decision Aids – Financial Planning Budgets – Cow-calf IRM SPA
   - **Note:** Economic Analysis of Select Health and Production Practices - pdf xls
- Wisconsin Center for Dairy Profitability – Decision Making Tools

The VM 577P Shared Folder contains a collection of example spreadsheets

on-campus – \\vetmed.wsu.edu\cvmdata\shared\VM577HPM   (permission required)

off-campus - https://cvmdata.vetmed.wsu.edu/Shared/VM577HPM (authorization required)

When you find other good spreadsheets, please let me know or send me a copy. Due to declining budgets and the loss of personnel, these resources are at risk of disappearing when websites are reorganized and downsized.

4. Determine the structure and components of enterprise budgets for the type of livestock producer you selected above.
   - Look at the layouts from several sources to see how they are constructed and combine those ideas that work best for you.
   - To start from one of these as a template if you wish:
     ○ Save the spreadsheet from the browser to your flash drive or directory.
     ○ As many contain macros blocked for computer security reasons, you may have to enable macros to open the spreadsheet.
     ○ Enable editing. If the entire spreadsheet is password protected, you may be able to recover it by copying it as a block to a new page, keeping the formulas.
     ○ So that you can keep rows and columns straight on the printed page, bring back all the cell borders by clicking the upper left corner to select all, right click to bring up the editing menu, click on "Format Cells . . .," click on both "Outline" and "Inside" and then click on "Okay".
   - Sophisticated Excel users may want to use separate sheets for feed and veterinary costs, carrying the summary values to the front sheet
   - The printed output will be most convenient if it fits vertically on 8.5 x 11 pages from the top down rather than side to side and if it resembles book formats

     IMO, a row by column format works best where a row is an input, say alfalfa hay, and groups of rows are similar inputs. The first input column has the name of the input (alfalfa hay) and the second the annual amount purchased. Then the next column calculates the total cost, the next the cost per production unit (calved cow), the next the cost per unit produced (weaned calf or 100 wt milk, and (for cow-calf), the cost per 100 wt of calf weaned.

5. Design or modify the spreadsheet to provide "What if" flexibility to compare different scenarios, such as "Does a $5 per head vaccine that increases reproductive efficiency 1% pay?"

     You are free to create this in the fashion that best meets your needs. My ideas are the following:
   - Incorporate the major production variables in one cell, such as:
     ○ The herd size
     ○ The average production
       ■ For dairies, put the herd's average days in milk and the average daily production in lbs.
       ■ For beef cow-calf, put the average weaning weight.
       ■ For those things that are significantly different between groups (e.g., production by 1st calf, 2nd calf, and 3+ or weight by heifer vs. steer) and that information is available split them out.
     ○ The important production profile rates (e.g., cow cull rate, cow death loss rate, heifer death loss rate, calving rate (number of calves / number of cows bred), calf death loss rate) for the type of enterprise.
       ■ Be sure to include those that can be manipulated by veterinary interventions.
       ■ If the rate is different between groups, separate out the groups. For example, the death risk for the dam and calf due to dystocia is often higher in first calf heifers than in cows. The pregnancy rates of second calf beef cows is often lower than that of first calf heifers or older cows.
   - In the main body of your spreadsheet enterprise budget put at least the following columns:
     ○ Per unit costs of inputs (e.g., cost per ton of hay)

- - - Quantity of input consumed per production unit (e.g., tons of hay per cow). If the quantity is different between age groups, make each one a different row.
    - Cost or revenue per primary unit of production (e.g., per cwt (hundredweight) of milk (dairy) or cwt of calf sold (beef))
    - Total cost or revenue per cow at the herd average production per cow.
  - In this main body, each type of input cost (e.g., lactating cow hay) or one income (e.g., cull cow income) should be a row.

6. Because feeds are the largest component of variable costs and are highly variable, break feed costs into sufficient detail that each ration component for each production stage is present as a row.
   - Be aware of the volatility of feed costs, which occurs due to such things as drought in major production areas, crude oil price volatility (which affects fertilizer as well as fuel costs) and events in other industries consuming these inputs. Within this volatility lies opportunities for substitution as well as significant financial risk and health risks that will involve the veterinarian.

7. Break veterinary costs into at least professional fees, prevention (vaccines), routine group treatments and procedures (e.g., worming, pour-ons, implanting) and "other".
   - Be careful of the veterinary cost estimates in many of the livestock budgets because they often include biologicals (vaccines), pharmaceuticals (pour-on's as well as injectable drugs, dry treatments), foot-trimming costs and breeding costs (semen, synchronization drugs) under "veterinary costs."
   - For examples of broken out veterinary costs, see the Colorado Decision Tools and Manitoba livestock cost of production budgets.
   - Due to the competition in the biological and OTC drug supply business, the gross margin for drug and biological sales is often as low as 8% for large ranch and dairy accounts. Thus, only a portion of these overall veterinary costs are a direct professional service fees and only a small portion of the balance winds up in your pocket even if you market these products to producers.

8. Include each routine item (e.g., vaccines, wormers) as a row by name and use per label recommendations (i.e., two shots for killed viral vaccines) in a typical prevention program that you would recommend your type of client and include per animal costs.
   - **Note:** Government websites are constantly reorganized and their broken-link problem is increasing, particularly for USDA resources. If you find a government resource useful, download it to your own library to "preserve" it!
   - To determining what those producers are using, see the relevant NAHMS reports. As these are large PDF files, searching the pdf on-line works best. Examples are the following (PDF page rather than document page):
     - Beef cow-calf:
       - Vaccine usage – Section I:B of 2007-08 Beef Cow-Calf Studies.
       - Parasiticide usage – Section I:C of 2007-08 Beef Cow-Calf Studies
     - Feedlot
       - US Feedlot Processing Practices for Arriving Cattle (2012 pdf)
       - Injections - PDF pages 10-22 of Feedlot 99 Part II
       - Metaphylaxis usage - PDF page 8 of Feedlot 99 Part III
       - Parasiticide usage - PDF pages 33-34 of Feedlot 99 Part III
     - Dairy
       - Vaccination and preventive practices - PDF pages 55--60 of Dairy 2007 Part I
     - Swine
       - Vaccinations - various pages of Swine 2006 Part I and Part II
   - For approximate costs of vaccines, wormers, delousers, fly tags, vitamin injections, growth implants and so on, you can use the following (no endorsement intended or implied) - Allivet, American Livestock Supply, Animart, PBS Animal Health, Valley Vet - or others

9. Include the labor and facility costs and debt service.
   - Understanding the overall costs and cost per production unit of machinery and major facilities (animal housing, feed storage and handling, milking parlor) is important, particularly for making benchmark comparisons between herds and when making recommendations that involve purchasing new equipment, such as a feed mixer.
   - Pay careful attention to how labor and machinery costs are allocated between the farm's enterprises, particularly between crops and livestock.
   - Be very careful how labor costs are established, particularly for family labor and for hired labor that has housing, utilities and some food provided. These should be valued at the alternative market price.

10. Modify the spreadsheet to reflect the economic and husbandry conditions of a typical client and to assess the impact of potential trends and scenarios.

   At this point, your spreadsheet represents the general cost structure for an average client rather than a particular herd. Due to supply and demand effects caused by weather and other factors, the prices of inputs such as feedstuffs and replacement cattle as well as outputs such as milk and cull cattle are quite variable. However, if set up well, you can enter a herd's information into the spreadsheet to examine "what if's" for various scenarios. For example, how much does reproductive performance have to increase to justify the cost of including a new vaccine in the vaccine schedule?

   - To evaluate future scenarios, set up analyses for "best case" (top 10%), "worst case" (bottom 10%) and "most likely" (median) for important input prices and output prices
     If you have access to information from a particular herd, use it if the herd represents the clientele you expect to have in the future.
   - Current prices within a region for feedstuffs, cull and replacement cattle are available from several on-line sources.
     - Formerly one of the largest set of links was the USDA Livestock and Grain Market News Branch . Select "Market News" then "Livestock, Meats, Grain and Hay", and then "Cattle" or "Hay" under Browse by Commodity. Under the headings are sets of local livestock markets. Hay and other feedstuffs are under their commodity listing. Note that many of these are FOB so shipping costs to the farm have to be added. I expect these government sources will become increasingly unreliable.
   - Typical livestock prices for the previous month are available in LMIC (livestock marketing information center) and Understanding Dairy Markets
   - For pricing of feedstuffs that aren't traded, such as corn silage, see "Pricing Forage in the Field" (Iowa A1-65 pdf) and "What is the value of a standing corn crop" (NDSU EC-1343 pdf).
   - For pricing pasture, see documents such as "Determining Pasture Rental Rates" (NDSU R-1092), "Computing a Pasture Rental Rate" (Iowa C2-23 pdf), or identify others by using the terms "pasture rental rates" in Google.
   - Recent prices of livestock and commodities are also available in some farm trade magazines (e.g., Drover's for beef cattle and milk)
   - Another source of market prices is my "Basis of Marketplace Economics" handout

Discussion and Comments:
   1. Veterinarian usage:
      How are veterinarians used by your future clientele? What are the likely trends in this use? What is the "SWOT" for this aspect of practice?
   2. Cost of professional services
      Contrast the evidence on cost of professional services per production unit with your expectations from the professional services exercise.
   3. Preventive practices
      Why do significant proportions of producers likely use or not use particular classes of vaccines? What information do you need to justify this use or non-use? Where can you find this information or, if you

can't find it, how can you develop it for your clients?

A few networking names for on-farm veterinary economics:

Dr. Tim E. Carpenter, UC Davis

Dr. John Fetrow, U Minn Center for Dairy Health, Management, and Food Quality

Dr. David Galligan, U Penn

Dr. Charles E. Gardner, dairy practitioner, DVM columnist

Dr. Mark Hilton, beef clinician, Purdue   Midwest Beef Consultants

Dr. Harlan Hughes, NDSU agricultural economist emeritus, BEEF columnist (many applied articles)

Dr. Robert L. Larson, Kansas State

Dr. Michael W. Overton, Formerly U Georgia (created interesting spreadsheets)

Dr. Barrett D. Slenning, NC State

Dr. Mark Wustenberg, dairy practitioner, Vice-president of Quality and Member Relations, Tillamook Cheese

Other References:

Applied Agricultural Economics in In-print & on-line production medicine information references

Morris, DL (ed.). **Standardized Performance Analysis of Beef Cattle Operations**. *Vet Clin NA Food Animal* 11(2), July 1995.

Koontz, SR (ed.). **Economics of the Red Meat and Dairy Industries**. *Vet Clin NA Food Animal* 19(2), July 2003.