

## Enterprise budget for a yak meat production system

Jeff Lehmkuhler, Extension Professor, University of Kentucky

Often livestock owners decide to support a local demand for high quality meat. However, as livestock owners begin down this path many questions arise. What are the laws and liability concerns for selling meat direct to consumers? What is the process for developing a label for meat? What label claims can be made for a meat product? What processor should be selected? How does one complete a “cut sheet” with the processor? How will one build a customer base? What should one charge for the meat? These are just some of the questions that arise when developing a direct meat market. This article will not cover all of these areas and readers are encouraged to seek out additional resources and information become informed on the local laws, access to farmer’s markets, list of processors, and other information. The purpose of this decision tool is to assist yak owners to arrive at a selling price for processed meat. The spreadsheet provides one to assess the input costs for raising a weaned yak to harvest. The sheet also includes the meat processing input costs to allow one to determine a price point to selling yak meat. The remainder of this article will be a guide towards using the decision tool.

### Starting Point

Enterprise budgets are designed to assist one in assessing the production of an item whether that is an animal, crop, fiber or other item. An enterprise may be a segment of a production chain or system. As an example, a yak herd will have mature breeding animals, replacement breeding stock, and potentially a group segmented out for meat production. Each of these groups can be their own enterprise as each could produce a marketable product. Weaned calves could be marketed from mature brood cows or their calves could be retained for breeding or meat animals. However, the cows incur expenses for pasture, feed, supplements, health programs and other items that must be paid. If you raise yaks and are keeping your own yaks back to enter your meat enterprise, you should be paying the cow-calf enterprise for the value of the weaned calf to cover the costs for maintaining the mature animals that raised the weaned stock. The role of an enterprise budget is to estimate production costs to determine a market price target. A budget is not the same as a ledger. A budget uses estimated expenses based on the best information available at the time. A ledger is a recording of the actual input costs and receipts for an enterprise. For this reason, enterprise budgets should be reviewed routinely and adjustments made.

As you begin going through this spreadsheet tool there are a few things to consider. First, this decision tool assumes one has purchased a weaned yak calf. Second, you may not know some of the information requested. You can visit with your local veterinarian to develop a preventative health protocol and obtain estimates for health care expenses. Feed inputs may be estimated by obtaining information on local hay markets or using your hay production costs and obtaining prices for mineral and other supplements from your local feed dealer. The land base needed can be obtained by visiting with local Extension, Natural Resource Conservation Service or using the NRCS Web Soil Survey online tool as well as talking to local livestock managers. As many of the same animal husbandry protocols can be applied to yaks, utilizing beef-related information can be a useful place to start and adjusting for the lighter weight of yaks. As you begin obtaining prices you

can use this information and enter the information into the corresponding area on the sheets. Lastly, this sheet covers the variable or out of pocket expenses. For a more accurate assessment of the enterprise, be sure to prorate equipment, fencing and other purchased items out over the life of the item, number of animals using the equipment, and deduct the salvage value if any from the cost of the item and add these expenses to the budget. As an example, a used squeeze chute was purchased for \$10,000 to safely handle animals. This item is expected to have a life of 15 years in a herd of 10 breeding aged cows that are expected to produce 8-9 calves annually. The salvage value is only expected to be around \$500. The overhead or fixed cost per animal for this piece of equipment is approximately \$35 per animal annually ( $\$10,000 - \$500 / 18 \text{ head} / 15 \text{ years}$ ). You choose what you input and the more accurate your estimated expenses, the more closely the projected selling price for the meat will be to cover your actual expenses.

Table 1. Abbreviations used in the sheet.

hd	head or single animal
lb	pound
d	day
BW	body weight
avg	average
wt	weight

You may not have actually purchased a calf, but rather are retaining a calf from your mature cow herd. Start by going to the “Calf First Winter post-wean” tab and enter the actual or estimated weight of weaned calf. Record the value of the calf needed to cover the production costs for the cow or the opportunity cost for the calf if it were sold as a weaned calf. Enter the calf value in the “Amount paid for calf at the start of the winter” cell (Figure 1). The worksheet will then automatically calculate the price per pound paid based on the weight and purchase value entered. The daily gain expected during the winter feeding period is then entered along with the anticipated duration of the winter feeding period. The worksheet will then provide an estimated weight at the end of the first winter feeding period using the projected daily gain and days fed. You can enter the estimated age at the start of the production phase and given the targeted duration of the phase an estimated age at the end of the production phase is calculated. You can then transfer this ending age to the next tab as the starting age for the next phase of production.

Figure 1. Winter Feeding Budget sheet for a weaned yak calf for the first winter.

Winter Feeding Budget: First winter after weaning		
Weight of calf purchased, lb		325
Amount paid for calf at start of winter, \$/hd	\$	500.00
Calculated value at weaning, \$/lb	\$	1.54
Expected winter daily gain, lb/d		0.25
Estimated winter feeding period, days		135
Calculated calf weight end of winter season, lb		359
Hay/Forage cost, \$/ton	\$	76.00
Expected hay needs, % of BW as-fed (2.5-3% BW)		3.0%
Calculated daily hay need, lb/hd/d		10.3
Daily forage cost, \$/hd/d	\$	0.39
Winter forage cost, \$/hd/winter	\$	52.61
Supplement cost, \$/ton	\$	323.00
Feeding rate of supplement, lb/hd/d		2
Daily supplement cost, \$/hd/d	\$	0.32
Winter supplement cost, \$/period	\$	43.61
Water, \$/hd	\$	3.00

The next section of the worksheet is where the hay feeding information is entered. Hay cost is entered as a value per ton. This expense may be based on your actual purchase, opportunity cost if you were to sell the hay or production cost. Hay disappearance for yaks will vary depending on quality of the hay, size of the animal and feeding losses. Our research found that hay disappearance for yak calves will range between 2.5-3% of body weight, and you can enter the percent of body weight for hay disappearance. The worksheet will then calculate the daily hay needs, daily hay feeding cost and total winter forage expense based on the duration of the feeding period. If supplements are offered, such as cubes, grain, protein tubs, or other feed, these feed expenses can be entered next. The cost of water can be entered next. Water cost may encompass water from municipalities, wells to cover pump, tanks, drinkers, and electricity, or other sources of water that have expenses. Mineral supplements should also be accounted for in your costs. You can calculate the cost per ton of purchased mineral and supplements purchased in 50-pound bags by simply multiplying the cost per bag by 40. As an example, if your mineral cost was \$30 per bag x 40 bags/ton, the cost per ton of mineral is \$1,200. Many of the mineral and feed supplements you purchase will include feeding directions with a target intake. You can use this information on intake to input into your sheet or enter the actual observed intake of supplements offered. The sheet will then calculate your daily and total winter mineral and supplement costs.

Figure 2. Continuing the inputs for the first winter of over wintering a weaned yak calf.

Water, \$/hd	\$ 3.00	
Mineral supplementation cost, \$/ton	\$1,200.00	
Mineral supplementation intake, lb/d	0.2	
Daily mineral supplement cost, \$/hd/d	\$ 0.12	
Winter mineral cost, \$/period	\$ 16.20	
<b>Total Feed Expenses, \$/hd</b>	<b>\$ 115.42</b>	
Vaccination costs, \$/hd	\$ 5.00	
Deworming cost, \$/hd	\$ 5.00	
Mineral supplement (bolus/injectable mineral), \$/hd	\$ -	
Tag/Animal Identification, \$/hd	\$ 1.00	
Antibiotics/Medications, \$/hd	\$ 12.00	
<b>Total Calf Health Expenses, \$/hd</b>	<b>\$ 23.00</b>	
Death loss rate, % (ex. 1 hd/20 calves = 5%)	1.00%	
Death loss, \$/hd/d	\$ 5.00	
Interest rate on variable expenses	9.0%	
Interest on variable expenses	\$ 21.25	
<b>Fixed Expenses</b>		
Land cost	\$ 9.00	
Equipment costs	\$ 8.00	
Facilities costs	\$ 5.00	
Insurance, taxes, repairs	\$ 3.00	
Fuel	1	
<b>Total additional cost, \$/hd</b>	<b>\$ 52.25</b>	
Labor, \$/hd	\$ 5.00	
<b>Total phase production input costs</b>	<b>\$ 195.67</b>	
<b>Total costs, \$/hd</b>	<b>\$ 695.67</b>	
Breakeven price, \$/lb	\$ 1.94	

Working with your veterinarian, you should develop a preventative herd health protocol. Yaks can and will have the potential to be impacted by the same pathogens that affect beef cattle. Depending on your region, internal and external parasites may also be of concern and need managed. Animals may also need to be treated for diseases or disorders which may include veterinary services and pharmaceutical expenses and these costs should be estimated in the budget. Animal record are essential in management and often aided by having animals uniquely identified with an ear tag. The cost of these tags for identification should also be included in your budget as part of the health care expenses.

Losing an animal results in both an emotional and financial impact. Though we don't want to lose animals, it is always advised to budget for animal losses. Budgeting for a loss helps defer the costs of the lost animal to the remaining animals. The largest cost is the actual value of the animal. Death losses tend to be greater for young animals (<12 months) and very old animals (>12 years). Young animals may not receive sufficient colostrum to develop passive immunity and become more susceptible to pathogens that may result in scours, respiratory disease or other disorders. As the animals are exposed to pathogens, get infected and build immunity to these pathogens, and survive the infection, they build immunity to the pathogens they are naturally exposed to on a daily basis. The extent to which this immunity lasts varies and may be long-lived, as is the case for anaplasmosis, or short-lived, weeks to a few months, which would be case for most of the pathogens impacting respiratory disease and reproductive losses. The variability in risk of exposure, duration of immunity once exposed, well as the pathogenicity of organisms are

reasons why consulting with your local veterinarian is critical in developing your herd health protocols.

Death losses are generally estimated based on experiences of managing animals in your environment under your management. When these losses are unknown, you must assume an average when budgeting. In an enterprise budget, death loss is assigned as a percentage of the animals in the group. This average is calculated as the number of animals lost divided by the total in the group prior to the losses. As an example, in a group with 10 weaned yak calves, losing a single calf would be a 10% death loss ( $1 / 10 \times 100 = 10\%$ ). In some herds, no death losses may occur for several years and then an animal is lost. As an example, if a herd managed 18 beef weaned animals over a period of three years, would be 6 animals a year, until an animal was lost, the death loss that may be used would be 1 animal / 18 animals = 5.6%. The reason death loss should be budgeted is that the loss of an animal that was purchased or could have been sold at weaning has a significant impact on the financials of the enterprise. As an example, if six calves were purchased at \$500 each, the total purchase cost was \$3,000. Losing a calf, increases the actual purchase cost for the remaining calves to  $\$3,000 / 5 \text{ calves} = \$600$  per calf. In other words, each calf now must carry an additional \$100 expense from the calf that is lost. Planning for death loss should be considered to ensure that your target meat price can cover any losses. In this sheet, the costs associated with purchase value, health and feed costs are covered by the estimated death loss.

Interest rate is to account for money borrowed for purchase of animals and operating costs. Even operations not borrowing money should account for the opportunity cost of investing those funds. In other words, if money was invested or was in a bank account accruing interest, this is forfeited when money is used to purchase animals, feed and other items needed to raise yaks. Therefore, the interest rate should reflect the actual loan rate of borrowed money or the opportunity cost of interest that could have been obtained from investing the money elsewhere.

Land cost can be accounted for either from using local known pasture rental rates or using your actual land cost. In regards to land cost, the land cost often is associated with the opportunity cost of the land versus another investment option. Taxes and insurance should also be accounted for when developing one's budget. Repairs should include estimates for fixing equipment, waterers, fences and other items that may be damaged as a result of owning livestock.

Lastly, labor is often broken out into hired labor and operator labor. In some situations, one may need to hire individuals to assist with handling animals and this should be accounted for in the budget. Operator labor is generally referred to as management. The financial return can then be used to cover some of the owner/operator labor/management even though it is not a cash expense as would be the case with hired labor.

The remaining tabs in the worksheet are similar. The grazing season tabs include a few new items that need to be entered. The first is pasture cost. This again is similar to land cost above. The same land may be used or animals may be moved to other grazing areas that are leased at a different rate than where animals are overwintered. The pasture cost may also include fertilizer, reseeding, and other expenses incurred to maintain productive forage growth during the grazing season. Stocking rate is a value that is often unknown by many at first. Many of us that have worked in the range and pasture management recognize that overgrazing is the most common

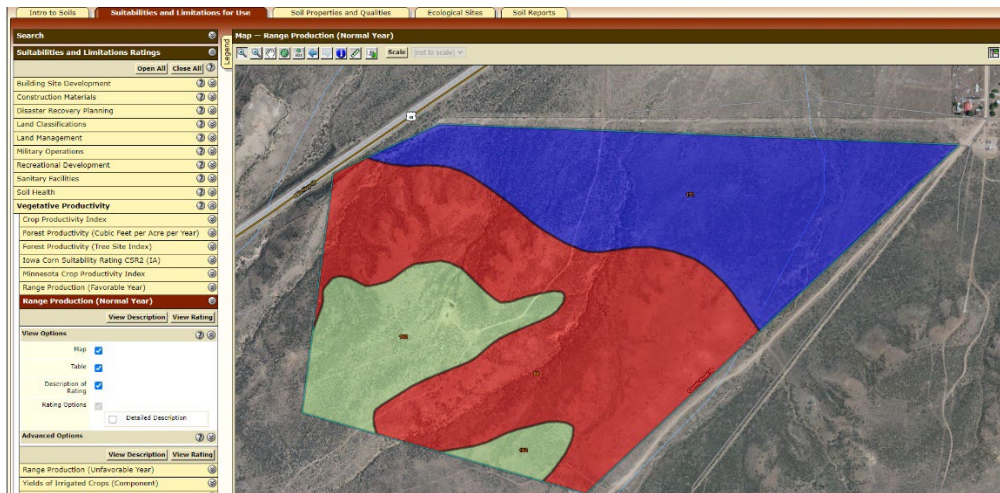
mistake made by livestock managers with respect to grazing. You can utilize a variety of tools and sources of information to determine your appropriate stocking rates. Those looking for a place to start might consider the NRCS Web Soil Survey online tool.

Figure 3. Pasture inputs for the grazing season tabs.

Pasture cost (land & maint), \$/acre	\$ 100.00
Stocking rate, pounds/acre	800
Calculated acres/animal	0.5
Pasture cost, \$/hd/d	\$ 0.77
Pasture cost for season, \$/hd	\$ 187.74

An example area of interest is shown below in Figure 4 for a 135-acre region just outside of Maybell, CO (Figure 4). Using the Web Soil Survey tool, we find there are three different soil types represented in the area of interest: Gracot-Maybell. Rock River sandy loam and Ryan Park sandy loam. The online tool can be used to explore the soil types for potential range productivity. Selecting the Vegetative Productivity area of the tool and selecting the dropdown for normal range productivity, we see the annual expected range forage productions varies by soil type between 505 and 850 pounds of dry matter for the growing season. Forage productivity will vary by year based on the climate conditions, soil nutrient levels, grazing management and other factors. This is a useful tool, however, to start with to get a better understanding of where to start with the number of animals that may be supported by the forage production potential of the soil type.

Figure 4. Example area of interest from the NRCS Web Soil Survey online tool.



Summary by Map Unit — Moffat County Area, Colorado (CO686)				
Map unit symbol	Map unit name	Rating (pounds per acre per year)	Acres in AOI	Percent of AOI
86	Gracot-Maybell complex, 5 to 30 percent slopes	505	62.0	45.7%
162	Rock River sandy loam, 3 to 12 percent slopes	680	24.3	17.9%
171	Ryan Park sandy loam, 0 to 3 percent slopes	850	49.3	36.4%
<b>Totals for Area of Interest</b>			<b>135.6</b>	<b>100.0%</b>

**Description — Range Production (Normal Year)**

Total range production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation. In a normal year, growing conditions are about average. Yields are adjusted to a common percent of air-dry moisture content.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

**Rating Options — Range Production (Normal Year)**

Using the information from the Web Soil Survey, we can determine an average of around 650 pounds of forage production potential for our 135-acres. One needs to estimate the intake of the animals as well as the projected length of the grazing season. An estimate of forage intake is 3% of body weight on a dry matter basis. If the animal size is 700 pounds, the daily forage intake on a dry matter basis would be 21 pounds of forage dry matter. The grazing efficiency under range conditions may be 55% meaning that not all the forage that grows is utilized by the grazing animal. Some of forage may senesce and die providing organic matter to the soil. Forage may be trampled and not grazed while others may be contaminated by manure and animals avoid consuming. The total amount of standing forage needed for the animal on a daily basis is roughly 47 pounds to account for the grazing efficiency. The duration of the grazing season may last from June 1 through the end of October or approximately 150 days. The total standing forage needed then for the grazing season is 7,050 pounds. Given the range area of interest produces 650 pounds over the growing season, the land base needed to support one animal is roughly 11 acres. Another way to look at this would be to say this 135 acres could support 12 animals weighing 700 pounds or 8,400 pounds of animal weight which is 62 pounds per acre. Some regions or states give the pasture productivity in animal unit months (AUM). An animal unit month is based the equivalent of a 1,000 pound beef cow with calf consuming 30 pounds of forage dry matter daily or roughly 900 pounds of forage dry matter monthly. A soil type with a rating of 5 AUM for forage would produce sufficient forage to support a 1,000 pound beef cow with calf for 5 months under normal growing conditions or a 700 pound animal for approximately 7 months. For this spreadsheet, you input the stocking rate as pounds of animal per acre the soil type and forage production can support for the normal grazing season. The sheet then uses the average weight over the grazing season based on your input for daily gain during the grazing season along your targeted grazing season length to arrive at the acres needed to support the animal over the grazing season.

Continue to enter your estimated expenses for the following winter and grazing seasons until your targeted age at harvest or weight at harvest is reached. The last tab in the worksheet covers the expenses associated with harvesting your yak for meat. Often the animal can be weighed live at the plant prior to being harvested. Your processing fee will likely include a flat processing fee plus a charge per pound of hanging hot carcass weight. The dressing percentage is the hot carcass weight divided by the live weight times 100. For instance, an animal that yielded a 350 pound hot carcass weight and had a live weight of 800 pounds prior to harvesting would have a 44% dressing percentage. The weight loss of the hide, head, hooves and gastrointestinal tract is lost during the processing. Animals with large heads/horns, caked mud in the hair and/or heavily fed prior to harvesting will have lower dressing percentages. If possible, reducing the feed offered

12-24 hours prior to harvest will reduce the volume of the gastrointestinal tract improving dressing percentage. Reducing gut fill also reduces the weight your processor must handle and lowers the risk of carcass contamination from rupturing or cutting the GI tract.

Take the time on a few animals to weigh your actual meat you take home to arrive at a cutout percentage. Depending on your processor, how you tell your processor to cut your animal (bone-in or bone-out), organ meats, and other factors, you may see variability in the pounds of meat you have to market. If you want to spend additional time, sort your meat by cut and weigh by cut (i.e. roast, steak, ground) if weights are not listed on each package so you have an inventory to assist you in your marketing plan.

The worksheet calculates the total production cost by tallying the production cost from each winter and grazing period along with the processing expenses. You can add in profit value you desire for each processed animal. The total cost adds the initial purchase value of the animal into the overall cost. The average sell price per pound of meat is then calculated based on the total cost and the pounds of meat received.

This decision tool is simply provided to assist you in considering your input costs and expected marketable product to arrive at a target selling price. The tool does not include fiber production as this is a separate enterprise that can be pursued to add value to yaks raised for meat. Each operation will have varying input costs and animal performance levels. The author, therefore, provides no guarantee for accuracy and users assume the risks associated with using the tool. However, it is the hope that the tool will provide the user a better understanding of their production costs providing the user the opportunity to have a sustainable yak production system.

#### Acknowledgements

This work was supported by a Southern Sustainable Agriculture Research and Education On-farm Research grant project number 0S22-157. The author would like to acknowledge those individuals that provided input and reviewed the worksheet for their effort and includes: Greg Dike, Sophia Weiss, Daniele Garner, Jamie Sorum, and Feb Taylor.

Figure 5. Meat processing input sheet for yak meat.



Meat Processing Budget		
Assumes animal harvested at the end of the third grazing season near 43 months		
Animal weight at harvest, lb		823
Expected Dressing % (hot carcass wt / live weight)		55%
Calculated Hot Carcass Weight, lb		452
Cutout % (take home meat/hot carcass wt)		62%
Take home meat, lb		280
Processing Costs		
Kill fee, \$/hd	\$	65.00
Cut & Package fee, \$/lb	\$	0.65
Inspection fee, \$/hd	\$	85.00
Total Processing fees, \$/hd	\$	444.04
Further processing fee (brats, sticks, jerky), \$/lb	\$	3.00
Pounds of meat further processed		0
Total further processing fees, \$/hd	\$	-
Total processing cost, \$/hd	\$	444.04
Avg. Processing Cost per lb	\$	1.58
Total production costs, \$/hd (from winter/grazing sheets)	\$	2,020.15
Profit target per head, \$	\$	150.00
Total costs from weaning to harvest, \$/hd	\$	2,614.20
Average Sell Price, \$/lb of meat in freezer	\$	9.32