EXPLORING COST-TO-PRODUCE THROUGH AN EQUINE FARM MODEL

A Project Paper

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by

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ABSTRACT

The purpose of this project was to build a tool that would find the production cost of farm-produced product. This was done by using the Microsoft Excel program to build an interactive tool using expense and income inputs from farms to create a scenario farm to test the tool. A horse farm that would produce lessons was selected for the scenario. Throughout the process of building the model, the importance of good recordkeeping, even for intricate operation costs, was noticed as profits were observed to be lost quickly without the farm management being aware. For the farm scenario, the cost to produce a lesson was predicted to be $54.30. The knowledge of the production cost helped set expense budgeting and other income pricing for the farm in the scenario.

BIOGRAPHICAL SKETCH

Kendon's interest in farm profitability began during his exposure to agricultural business through his families' farms. After graduating from high school, he worked in the agricultural industry for several years before starting his college education in 2016. His role in the industry included a blend of horse and cattle care, mechanics, and business management.

Kendon completed an Associates degree in science at Penn State Berks in 2018. He then moved to Ithaca, NY when he accepted an equine farm management position at the Cornell University College of Veterinary Medicine. This role involved providing management and care for a herd of 30 horses and donkeys, which included stallions, broodmares, young horses in training for work under saddle, and young stock. In 2020, he enrolled in a bachelor's degree program at Cornell University to study Animal Science, which he finished in 2022. He continued studying at Cornell University and graduated with a Master of Professional Studies degree in Animal Science with a focus on dairy business management in 2023.

I dedicate this paper to the farm business owners and managers who are striving to find profitability in their industry.

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INTRODUCTION

Measuring profitability is an important factor for the financial sustainability of a farm. In a review that looked at 16 studies spanning from 1988 to 2013, many important variables that impacted profitability were identified. The review concluded by saying their findings imply that farming is not an easy task or vocation. Many farmers have left agriculture, stating reasons of low or no profit.[1] According to the 2023 Farm Sector Income Forecast provided by the USDA, net cash farm income is forecasted to decrease by 20.7% from 2022. But this decrease comes following two years of strong growth. If realized in inflation -adjusted dollars, the drop would still remain above the years 2002-2021 average.[2] Also, according to the USDA, the number of US farms continue to slowly decline, while the size of these farms increases. However, small family farms still account for 89% of U.S. farms. These farms only account for 17.8% of production. Many small to even mid-sized farms rely on off-farm income to survive.[3]

My grandfather was a dairy farmer. He followed several good opportunities that led him to build a nice farm where he could operate things as he thought was best. He built up a good herd of Holstein cows and had enough acres to grow crops to feed his cow herd, plus sell extra crops for cash. He always had good equipment since he purchased new or slightly used tractors and implements to use for farming. But he struggled to make profits or even balance the farm financially. My father had to work in the construction industry and send money back to the farm to help pay feed bills. Eventually my grandfather sold the cow herd and most of the equipment to cover debts. Several years later, one of my uncles started another dairy farm. He stayed with it for several years, but he too had to sell of his farm because he couldn't make enough profits to sustain the business. I was old enough to have worked with them and enjoy farming, but not entirely able to fully understand why neither of these farms didn't succeed. These circumstances

left an impression on me that farming was a business that struggled being profitable. But I also understood that farming produced food, so it had to be profitable. As I better understood agricultural management and business, I began to see how my families' farms, along with many other farms, could struggle to be financially viable.

To better understand profits, I chose to explore production costs. Market values tend to dictate the prices received for products such as milk or crops sold. But aside from the management's decisions, very little dictates what types of costs can be accrued while producing that product. In a paper that evaluates dairy farm cost efficiency, Tauer and Mishra (2006) observed that accounting systems did affect profits for dairy farms. This led them to say that better record-keeping and monitoring could give farms a reliable opportunity to determine the source(s) of inefficiencies.[4]

I set out to understand what farm profitability looked like by building a spreadsheet that tracked the expenses and income from one month on a farm. I chose to focus on a horse farm model because I was living on an active working horse farm during the time of my program. Living there gave me daily opportunities to ask questions and challenge myself as I was learning. Relying on relevant information and as much cost tracking as possible, I studied to understand what it cost a farm to produce a product. For my research, I relied on conversations with producers in the dairy, beef, and equine industries. My intentions for this was my assumption that each type of producer may give insight into an expense or income source that a producer in another industry might be missing unintentionally. I wanted to help managers understand what their cost to produce looked like and how it interacted with other parts of the farm, all on one single spreadsheet.

MATERIALS AND METHODS

The cost to produce a lesson on a horse farm was calculated using the Microsoft Excel program to build an interactive spreadsheet. The product cost was calculated by taking the total of expenses associated with providing the lessons, subtracting income brought in through the lessons taught, then dividing that difference by the number of lessons being taught. Income and expenses were based on monthly values. While the proposed farm in the example is a scenario, each value was made as current and accurate as possible to represent a real farm scenario. This was constructed through conversations through with farmers and farm managers.

For this model, lessons were chosen to be the product of choice. Riding lessons are a common product for a horse farm to produce. An interviewee explained that students will ride a horse under the instruction of a trainer or instructor during a half hour to full hour lesson session, teaching them first foundations for riding, then communication and form. Many students will take lessons for one to three times per week. It is common for riders new to the sport or developing riders to take lessons riding a farm-owned horse. Often, after a rider progresses to a certain point, they will purchase a horse of their own which they will then bring to the farm and pay to have it boarded. This is an additional source of income for the farm. Other sources of additional farm income include profits from sale horses and renting farm facilities such as arenas to host clinics. In the model, each of these sources of profits are included, but lessons are the main product produced.

Table 1. Equine Farm Expense and Income Sheet

Equine Farm Cost-To-Produce Calculator

****Producing lessons**

Expenses

Staff:	Rate 1	Rate 2	
no. of staff	2	1	
no. of hours	39		
Rate 1	$ 4,992.00	Rate 1:	$ 16.00
Rate 2	$ 3,432.00	Rate 2:	$ 22.00
Trainers	$ 4,560.00		

Utilities:		per unit	usage	
Electricity	$ 219.11	$ 0.274	800	kwh
Fuel	$ 95.25	$ 3.81	25	gal.
Gas	$ 50.55	$ 3.37	15	gal.
Other				

Feed	Total	Hay price per ton:	$ 317.92		
Hay	$ 2,145.96	$ 0.16		lb per horse:	15
Bedding	$ 2,520.00	per bag:	$ 7.00	per horse:	0.4
Grains		per lb		lb per horse:	6
Ultium	$ 3,724.92	$ 0.69	$ 34.49		
			$ 26.00		
Supplements	$ 614.25		$ 40.95		

Horse Care		average per service	visits per year
Veterinarian	$ 1,218.75	$ 325.00	3
Farrier	$ 2,301.15	$ 230.00	8
Chiropractor	$ 750.06	$ 120.00	5

Horse Purchases	Purschase Price
Horse 1	$ 1,700.00
Horse 2	$ 1,900.00
Horse 3	$ 2,000.00
Total	$ 5,600.00
Monthly Total	$ 466.67

Facilities	
Upkeep	$ 450.00
Principal	$ 2,585.00
Horse Equipment	$ 400.00

Supplies	
Fencing	$ 150.00

Equipment	Payments
Tractor	$ 550.00
UTV	$ 230.00

Grand Total:* *$ 31,455.67

Income

Board	$ 14,250.00		Price full board	$ 950.00

Lessons		*Price per lesson		
	no. per week			
Farm Horses	37		75	
Boarded Horses	15		75	
Trailered In	5		55	
Total Lessons*:	228	*per month		
Lesson Total	$ 16,700.00			

Facilities Rentals		per month	Trailer-in Fee	Day Rental Fee
Trailered In's	$ 500.00	20	$ 25.00	$ 200.00
Clinics	$ 200.00	1		

Horse Sales	
Horses Sold	Sale Price
Horse 1	$ 5,000.00
Horse 2	$ 7,500.00
Horse 3	$ 10,000.00
Total	$ 22,500.00
Monthly Total	$ 1,875.00

Grand Total	***$33,525.00***
***Monthly Profit*:**	$2,069.33

*income-expense

**Cost to Produce a Lesson:
$ 54.30

Board	
Cost per horse	$ 754.19

Farm Numbers

Farm Horses	15
Boarded Horses	15

1 general manager
1 barn manager
2 staff
Trainers

*1 horse per acre
30 acre farm
Barn
Stalls 30

RESULTS

The following sections explain the spreadsheet. Sources for pricing and justifications for the pricing are added. In the spreadsheet, the expenses are listed on the left while the income is listed on the right side of the sheet. In the following paragraphs, the expenses are explained first then followed by income.

Expenses

Staff expenses were calculated based on having one barn manager, two full-time staff, and several trainers. The barn manager and two staff would be responsible to provide care to all the horses. The trainers would focus solely on teaching riding lessons and training riders. Two hourly rates were selected based on competitive pay rates advertised for jobs in the Northeast region of the United States (U.S.). Rate 1 reflects the pay rate the full-time staff would be receiving. Rate 2 reflects the payrate the barn manager would be receiving. The trainers' compensation was based on $20.00 per lesson taught. It was assumed in this model that a general manager or owner was a different person from the barn manager. Their compensation would be the monthly profits generated by this farm.

Utilities expenses were based on data from two sources. Electricity data was gained from New York State Electric and Gas (NYSEG), a utilities provider in the Northeast U.S. Fuel and gasoline prices were acquired from the U.S. Energy Information Administration website for the Northeast U.S. These prices were reflective of current data on or about July 3, 2023. Usage was estimated based on usage numbers for horse farms. The usage estimates include the electricity used by lighting and water pumps to supply well water to the barn. Fuel usage and gasoline usage was based on tractor and utility vehicle (UTV) usage per month.

Feed expenses were calculated based on horse forage and feed intake data from the USDA. For this scenario, it was assumed that each of the 30 horses on this farm weighed an average of 1,000 lbs each. Their daily diet includes 15 pounds of alfalfa and mixed grass hay, 6 pounds of grain, and a vitamin and mineral supplement. This is in addition to pasture forage consumed while being turned out on pasture each day. Bedding expenses were calculated assuming that each horse would use nearly one half of a large bag of shavings per day to maintain ideal stall conditions. Prices for hay were obtained from auction reports in the Northeast for July 6, 2023, and posted on the USDA Hay Market Prices website. Bedding prices were obtained from Lilley's Feed and Tack, a Northeast supplier. Grain pricing was obtained from Tractor Supply for stores located in the Northeast U.S. Supplements pricing were obtained from the SmartPak website for a daily feed, multi-purpose vitamin and mineral supplement.

Horse care expenses were based on the farm horses only. It was assumed that the owners of the boarded horses would pay for horse care expenses themselves. Veterinarian costs were based on a spring and fall vaccine and dental visit, plus one additional visit for health monitoring or maintenance. Farrier expenses were calculated based on the shoeing recommendation of every six to eight weeks, and that every other shoeing would require a new set of four shoes. To support sustained health of the farm horses, chiropractic treatments costs were included in the expenses. This cost was based on the recommendation of 10-12 weeks between treatment visits.

Horse purchase expenses were also incorporated into the model. If horses are being sold, horses to replace those sold would need to be purchased and included in the calculations to maintain a consistent number of farm-owned horses. For these purchases, a farm could buy or adopt young horses, (i.e., thoroughbreds) who are retired early from racing. These horses could be trained during the lessons by riders in the instruction of the farm's trainers. Horses have

different levels of appeal to horse buyers. The differences in purchase prices reflects levels of value. These prices were based on adoption fees or purchase costs from regional organizations.

Facilities expenses were based on estimates to maintain a facility needed to house this model. It was estimated that a farm of this size would use $450 per month to maintain the facilities. This includes budgeting for larger repairs or maintenance such as replacing a roof. The principal expense was based on a 30-year fixed term loan for $625,000 at 2.85% interest. Horse equipment expenses represent an estimated monthly amount that would cover tack and supplies such as saddles and grooming equipment used to provide lessons taken on the farm-owned horses.

Supplies expenses were estimated based on supplies needed to maintain the property, such as pasture fence maintenance and equipment maintenance or minor repair costs.

Equipment expenses were included to cover the costs to have a tractor and UTV on the farm for farm management and staff to use to perform daily chores. The cost for a tractor was for a suitable sized tractor with a bucket loader attachment purchased new. The cost for a UTV was calculated based on the purchase of a new machine. Other machinery such as bale forks for moving hay or manure spreaders were not included into this model. It was assumed that the life of the machinery would extend beyond the life of the loan. After the loan is paid off, the money budgeted for the payment could be used for repairs or small purchases of other equipment.

Income

Horse boarding income was included for fifteen horses. While boarding these horses would increase the overall expenses such as hay, feed, and staff hours, the money charged from

boarding these horses would generate a profit because the board price was set at a margin of $150 above the cost for the farm to provide the board.

Lesson income was calculated based on each farm horse being used for two lessons and half the horses would do an additional lesson per week, bringing the total lessons per week to thirty-seven. For many horse farms, this is a light workload and is reasonable for the horses, especially ones receiving this level of care. Each of the boarded horses would be required to take at least one lesson each week with a farm trainer. Because of the facilities and opportunities a farm such as this would offer equestrian riders, it was assumed there would also be riders who lived off-the-farm that would want to trailer their horse(s) in, and an average of at least one per day. Lesson pricing was split into three categories and was based on how much each lesson required of the farm. For example, farm horses would require more time and tack from the farm compared to boarded horses. Therefore, farm horse lesson pricing was set higher than boarded horse pricing. Boarded horses were required to take one lesson per week with an instructor. This is also a common practice among horse farms.

Facilities rental income included several types of income. Horses trailered in would be charged a fee per horse per use to use the facilities. The facilities could also be rented for a day to host an event such as a riding or training clinic.

Income from horse sales assumed that three farm horses, each with different values, would be sold per year. The total amount of horse sales was divided by twelve months to incorporate in an average monthly income for the farm. Some farms also offer horse training. This was excluded from this scenario because the time required for trainers to teach the weekly lessons wouldn’t allow them enough time to also train horses. The horses being sold would be ridden in lessons by riders in the instruction of the trainers.

Lesson Cost

Overall, the tool predicts that the cost to produce each lesson is $54.30. This was calculated by taking all expenses from the farm and subtracting the lesson income, facility use or rental income, and sale horse income from the total expenses. calculates this by incorporating all the expenses associated with producing a lesson and dividing that by the number of lessons being produced. The formula is as follows:

((Expense grand total)-(lesson total+trailer-in fee+horse sale monthly total))/total lessons taught).

DISCUSSION

Assuming that the purpose and goal of this farm is to produce lessons, one must know what it costs the farm to produce that product to remain financially viable. By knowing this, the farm management can adjust profit margins on lessons or restructure costs accordingly to retain profits through the business. One interesting relationship is how additional income affects the cost to produce a lesson. For example, if horse sales are lower or higher than projected, it changes the lesson production cost inversely. If farm horse sales were higher than expected the cost to produce lessons would decrease. This would give the farm financial flexibility to pursue opportunities such as lowering the lesson prices for that year to run promotions to increase lessons to new clients or make farm improvements.

Additional sources of income impact the cost of lessons. Knowing the production cost also gives the producer the opportunity to make decisions about what expenses to incur or

decline. While most of the expenses in the scenario were fixed, several could be adjusted to either make the farm more attractive as a business or eliminated to cut expenses.

During one interview, the producer mentioned that many farmers lack a clear understanding of what their production costs are because they keep very few records. When these products are sold at market value, the farmer often doesn't have a clear understanding if the farm is profiting or not. Using this tool or a similar tool keeps that cost to produce in clear sight.

Another reason why knowing a cost to produce is important is it can be helpful for evaluating efficiencies. If the cost to produce is higher than the farm management is comfortable with, identifying the factors responsible for those financial circumstances can help improve the cost effectiveness of the farm.

CONCLUSION

This model highlighted the importance of tracking the costs associated with producing a product. By outlining what that product is, farm managers should be able to focus on optimizing the efficiencies surrounding those profits. Other factors such as additional income to the farm aside from the primary product sold are also important part of farm income. These help to keep the cost of producing that product realistic while also providing additional income to the farm.

Overall, using this tool on the scenario farm highlighted the importance of tracking as much income and expense as possible to have a real perspective on what the production costs truly are for that product. Without having records or tracking the inputs, expenses, or income, it would be very difficult to track profits.

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