

HONEY PRODUCTION:
WHAT'S THE BUZZ?

By

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Abstract: This research aims to educate current and potential small-scale producers in the beekeeping industry on producing honey and related products. It outlines the process on how to perform break-even calculations on both single and multi-product production, as well as assess the feasibility of cash flow timing and profitability of each operation through financial statements. It also reevaluates cash flow timing feasibility and profitability when financing each scenario with a conventional loan. This research also provided producers with information on how to harvest honey and expand their production into a multi-product scenario through wax products. It gives insight on the liability they may face and how to market their products.

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CHAPTER I

INTRODUCTION

The rise in popularity of backyard beekeeping has led to many considering joining the trend. According to the IBISWorld industry report (2021), the beekeeping industry has seen a 7.6 percent annual growth rate from 2016 to 2021 (Madigan, 2021). With the prospect of yielding multiple products, this agricultural enterprise has stirred quite the buzz. The Oklahoma Apiary Act offers guidelines and protection for Oklahoma beekeepers that allow for urban hives, making beekeeping a potential extra source of income for rural and urban families as well as commercial producers (Oklahoma Apiary Act, 2005). Honeybee producers are eligible for assistance through FSA's Emergency Assistance for Livestock, Honeybees, and Farm-raised Fish program, also referred to as ELAP. ELAP can aid with financial loss associated with bee colony loss due to natural disasters, or Colony Collapse Disorder (Farm Service Agency 2021). These policies have helped assist producers in mitigating the risk of their production, making beekeeping even more enticing.

Beekeeping and harvesting honey are multi-step activities that require minimal experience to get started; however, to be successful both activities require specific skills and background knowledge. As the popularity among backyard beekeeping rises, so has the need for training and knowledge on the skills needed for the enterprise.

Due to backyard beekeepers' inexperience compared to commercial operations, many bee losses can be attributed to lack of knowledge of how to maintain their hive (Kulhanek et al. 2017). The analysis presented in this thesis was performed to aid producers in understanding the costs and potential revenue associated with honey production and give them the skills to determine prices for their products.

Research Objectives:

General Objective:

The purpose of this analysis is to provide information to small-scale producers about the best practices for honey and wax product pricing.

Specific Objectives:

This analysis will also:

1. Help estimate the costs of harvesting honey and the addition of wax products.
2. Inform producers on how to perform breakeven calculations to help determine pricing for single versus multi-product production.
3. Evaluate cash flow timing and profitability through cash flow and income statements.
4. Create the ability to provide an interactive factsheet and downloadable spreadsheet for producers to use to make their own calculations.

CHAPTER II

BACKGROUND

Honeybees in the United States

Popularity surrounding beekeeping arose amid concern for the declining honeybee population. As described by Oldroyd (2007), reports of the bee colony loss trend brought into the question the need for protecting honeybees. In 2007, American beekeepers began expressing the unexplainable bee loss rate from their apiaries that resulted in research into Colony Collapse Disorder, also known as CCD (Oldroyd, 2007). The honeybee population decline has continued to be an issue in more recent years. From 2012 to 2020, the USDA reported hive loss to be unsustainably high with an estimated national loss of 22 to 36 percent (USDA, 2021). Driven by concern for honeybee's, state and federal policies have been enacted to aid their survival. In 2009, a national survey of honeybee pests and diseases was funded to record bee disease, parasites, and pests to provide context and solutions for bee loss (USDA, 2020). Many states have passed apiary laws that allow for urban production to combat losses.

The emphasis on saving honeybees is not a cause without merit. Not only are bees a multiproduct enterprise, but they also provide vital externalities. As the United States' primary pollinators, honeybees are essential to crop production (Bartuska, 2021). With more than one-third of all crops requiring pollination, honeybees enhance yields

and diversification at an estimated contribution of 15 billion dollars a year (Bartuska, 2021). A declining population of pollinators results in a reduction in crop yields, and without efforts made to increase pollinators, producers can be faced with the need to expand cultivation areas (Aizen et al. 2009).

Although honeybees have numerous benefits such as improving crops, their biggest product generating revenue is the production of honey. From 1997 to 2009, United States honey consumption fluctuated between 325 to 425 million pounds (Matthews et al. 2019). In 2020, 148 million pounds of honey was produced in the United States, a six percent increase from 2019 (USDA, 2021). With U.S. supply only accounting for a fraction of domestic consumption, a large portion of honey is imported from foreign suppliers. However, the fluctuation in U.S. production has impacted domestic honey prices. The United States Department of Agriculture found that honey prices increased approximately 2 percent from 2019 to 2020 (USDA, 2021). The process of how to harvest and label honey, create and label additional products, the liability producers may face, and how to market their product can be found in Appendix A through D.

Importance of Budgeting

Budgeting is a vital part of any enterprise, and beekeeping is no exception. Oklahoma State University released a fact sheet in 2021 highlighting the necessary items and outlined a budget for the equipment needed to start a backyard bee project. Not including the additional costs of honey harvest, the enterprise's initial investment totaled to approximately \$685 (Bir et al. 2021). Budgeting can be a helpful tool when

determining prices for products, specifically using break-even analysis. The break-even point is where the amount of revenue produced by the enterprises is exactly equal to the costs accumulated during production, making profit equal to zero. This analysis is a great way of assessing how much a producer should charge given the volume of product they have produced. A study by Lis Sintha (2020) highlighted the importance of break-even analyses for micro, small, and medium enterprises. It was found that calculating break-even points can aid new businesses in limiting unexpected expenditures, setting target revenue points, financing, determining better prices, covering fixed costs, and developing smarter business decisions (Sintha, 2020).

Estimating the annual cost of production is one of the first steps when creating break-even prices for enterprise budgets and can be done by calculating ownership costs. Ownership costs can be partially accounted for through what is often referred to as the “DIRTI-5”. The DIRTI-5, used to evaluate fixed costs associated with production, are depreciation, interest, repairs, taxes, and insurance. Used in numerous types of enterprises, this method evaluates the unavoidable ownership costs to estimate the production’s annual cost. This procedure also accounts for the depreciation of equipment and the opportunity cost associated with production and the opportunity cost of investing your money elsewhere (Hall, 1973).

Feasibility and Profitability in Beekeeping

In year one of a bee enterprise, it is unlikely a producer will harvest any honey, bee’s need time to forage and build their population before they produce surplus honey—surplus honey refers to the amount of honey a producer can take from their hives for their

use. Bee's need approximately 60 to 70 pounds of honey within their hive to survive the winter in colder climates (Blackiston 2020). Since the producer will not be generating any revenue in year one, the timing of cash flows becomes important when assessing the feasibility of this production. Using average Oklahoma honey prices sourced from producers throughout the state, the feasibility of producing eight-ounce bottles of honey was evaluated through a cash flow statement, as seen in Table 1. This showcased that although this harvesting scenario produces a negative return in year one, years two through five produce a return large enough to make the project cash flow. The assumption is that no honey is produced for sale in year one, yet the beekeeper pays all start-up costs out of pocket in year one. Table 2 highlights the profitability of the harvesting scenario through an income statement. Although the producer will face a negative net income in year one, years two through five indicate a positive net income. Because beekeeping has the ability to expand to numerous products, this poses the question of how to produce other products feasibly in terms of both cash flow and net operating income.

8oz Single Self-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
TOTAL CASH INFLOW	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Operating Expenses						
Labor	\$ 543.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.03	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 720.00	\$ -	\$ 180.00	\$ 180.00	\$ 180.00	\$ 180.00
Repairs	\$ 269.80	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment	\$ 1,079.20	\$ 1,079.20				
TOTAL CASH OUTFLOW	\$ 4,112.78	\$ 1,541.92	\$ 642.72	\$ 642.72	\$ 642.72	\$ 642.72
Cash Flow Summary						
inflows-outflows	\$ 1,167.22	\$ (1,541.92)	\$ 677.28	\$ 677.28	\$ 677.28	\$ 677.28

Table 1: 8 oz Single Product Self-Financed Cash Flow Statement

8oz Single Income Statement						
Revenue	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey Sales	\$5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Total Revenue	\$5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Expenses						
Labor	\$ 543.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.03	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 720.00	\$ -	\$ 180.00	\$ 180.00	\$ 180.00	\$ 180.00
Depreciation Expense	\$1,079.20	\$ 215.84	\$ 215.84	\$ 215.84	\$ 215.84	\$ 215.84
Interest Expense	\$ 390.54	\$ 107.92	\$ 107.92	\$ 84.67	\$ 59.09	\$ 30.95
Repairs	\$ 269.80	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Total Expenses	\$4,503.32	\$ 786.48	\$ 966.48	\$ 943.22	\$ 917.64	\$ 889.51
Net Income	\$ 776.68	\$(786.48)	\$ 353.52	\$ 376.78	\$ 402.36	\$ 430.49

Table 2: 8 oz Single Product Income Statement

Theory

The need for budgeting and evaluation of costs are driven by the neoclassical model of perfect competition, where a firm should never produce when it cannot cover the costs associated with production (Rhinehart, 2021). How much and at what price must a producer produce to keep their business afloat? Breakeven prices and short and long run shutdown points aid producers when making this decision. As previously mentioned, breakeven points are defined as the level of production and sales where revenue generated exactly equals the cost of production. However, what happens when those targets are not met? Shutdown points associated with production refer to the minimum price at which businesses will continue to operate (Masibo, 2021). In the short-run, a firm must be producing at a level at or above average variable cost. The term average becomes important for multi-product production being that “even if the marginal revenue drops below variable costs for one product the firm might still generate a profit through its other offerings” (Rhinehart, 2021). In other words, although one product might not be selling at a point above its average cost and may need to be discontinued, the average prices of its total products may keep the enterprise running. Long-run shutdown point refer to the business shutting down by not producing enough to keep up with the average total cost of production. Both shutdown points and breakeven analysis give insight to ensure a business is operating efficiently under the neoclassical assumption and is in a healthy position to continuing to operate.

CHAPTER III

METHODS

Using average prices obtained from Tractor Supply, Orschelns, GloryBee, Mann Lake, and Amazon four spreadsheets were created using excel to obtain break-even prices. Analysis was performed on two single honey scenarios, one producing eight-ounce bottles of honey, the other with one-pound bottles. Two multi-product scenarios were also evaluated, one producing eight-ounce bottles of honey, lotion bars, and lip balm and the other also producing lotion bars and lip balm but evaluating the production of one-pound bottles of honey. Each scenario assumed to have one hive in production that was harvesting ten deep Langstroth frames. Actual harvest may vary.

Single Product Scenario

For each single product scenario, the amount of honey produced using Langstroth frames were calculated using the yields for each frame size, with deep frames producing approximately six pounds of honey, medium frames producing four pounds, and shallow frames producing three pounds (Blackiston, 2020). These yields were used to calculate the estimated number of bottles of honey produced for each year. For the eight-ounce bottle scenario the total yield was multiplied by two to obtain how many half-pound bottles would be produced. Due to the limited amount of wax produced in early years

of production, producers may wish to only produce honey. In the single product scenario wax was not included as a sold product and is assumed to be used by the beekeeper in further productions.

The “DIRTI-5” was used to create an estimated annual cost of production. The “DIRTI-5”, referring to depreciation, interest, repairs, taxes, and insurance, assess the ownership costs associated with production. For this analysis, depreciation on the equipment was calculated using the straight-line method and assuming a zero-dollar salvage value in year five. This is a conservative assumption. With good care, hive equipment should last longer than five years. Interest, which can also be viewed as the opportunity cost of a producer investing their money elsewhere, was calculated using the average asset value multiplied by the assumed interest rate, ten percent, as seen in equation one (Kay et al. 2016). Repairs were assumed to be five percent per year and given the tax-exempt status of beekeeping enterprises, there were no taxes included. Insurance was estimated using Flip’s farmers market insurance plan at \$300 a year for a \$2,000,000 liability policy to cover risks of selling products (Farmers Market Vendor Insurance, n.d.). Additional details on the coverage of Flip’s farmers market insurance are available in Appendix C.

$$1. \text{ Interest} = \frac{\text{Purchase Price} + \text{Salvage Value}}{2} \times \text{rate}$$

Using the estimated annual cost of production, the single output scenario break-even prices were calculated by dividing the total cost by the amount of bottles produced, as seen in equation two.

$$2. \text{ BreakEven Price} = \frac{\text{Total Cost}_{\text{single}}}{\text{Bottles Produced}}$$

Where $Total\ Cost_{Single}$ is the estimated annual cost of production. $BreakEven\ Price$ is the price of honey which covers the cost of production, and $Bottles\ Produced$ is the quantity of honey produced, respectively.

Multi-Product Scenario

To obtain multi-product break-even prices for each product the prices of two products were assumed to be able to calculate the break-even price for the remaining product. For lotion bars, the break-even price was determined based on equation three listed below where honey and lip balm prices were predetermined.

$$3. \text{ Lotion Bar BreakEven Price} = \frac{TC - (P_H \times Q_H) - (P_C \times Q_C)}{Q_{LB}}$$

Where $Lotion\ Bar\ BreakEven\ Price$ is the price of lotion bars which covers the cost of production. TC is the estimated annual cost of production. P_H is the assumed price of honey. P_C is the assumed price of lip balm. Q_H , Q_C , and Q_{LB} are the total quantities of honey, lip balm, and lotion bars produced, respectively.

This process was repeated to calculate the break-even price for lip balms where honey and lotion bar prices were predetermined as seen in equation four. Given the accessibility of identifying typical honey prices through an internet search and the previous single input evaluation on honey, this analysis did not calculate the break-even prices of honey in the multi-product scenario. Rather, it used a set of prices over a range of retail prices. This process was duplicated for the one-pound honey analysis where once again prices were predetermined for each product.

$$4. \text{ Lip Balm BreakEven Price} = \frac{TC - (P_H \times Q_H) - (P_{LB} \times Q_{LB})}{Q_C}$$

Where *Lip Balm BreakEven Price* is the price of lip balms that cover the cost of production where P_{LB} and P_H are the assumed price of lotion bars and honey, respectively.

Financial Statements and Financing

To assess the feasibility and profitability of each of these scenarios, cash flow and income statements were created for each scenario. The cash flow statement helps portray the timing of cash in-flows and out-flows of the business during the budgeting period and showcases the cash flow feasibility of the project, while the income statement allows for the evaluation of profit and losses through net income (Beierlein et al. 1986), hence financial feasibility. To create the cash flow statement, the cash costs incurred in harvesting and production were subtracted from the cash received from each product to create a net return for the life of the enterprise. The income statement, which includes non-cash costs such as depreciation, lists the revenue received minus the expenses incurred over each year of the operation to calculate net income.

In order to deal with the initial investment of capital, each of these projects were lender-financed with an amortized loan that spread the fixed cost over the five years of each scenario. This loan incurred annual interest payments beginning in year one that were calculated at an assumed rate of 10%. It was assumed that principal payments would begin in year two, when the producer would begin generating revenue through product sales. Cash flow and income statements were created for each lender-financed scenario to assess the feasibility and profitability when financing each scenario with a conventional loan.

CHAPTER IV

RESULTS

Single Output Break-Even Price Results

When estimating the annual total cost of production for the single product scenarios, the straight-line depreciation was calculated to be \$215.84 per year over the five-year period. Interest, or the opportunity cost of the operation, at an assumed rate of 10% is \$53.96. This is calculated on the fixed costs, the capital outlay of beginning production. Annual repairs at 5% of capital outlay were also estimated to be \$53.96. Flip's Farmers Market insurance was used and costs \$300 a year for a \$2,000,000 liability policy. Beekeeping is tax exempt so there were no taxes. Total costs summed to \$623.76 and were used to create break-even prices for the single output scenarios.

Assuming the producer will use all honey produced, the 60 pounds of honey can be sold as 60 bottles of one-pound bottles or 120 bottles of eight-ounce bottles. After dividing the total annual cost by bottles produced, the eight-ounce single output scenario yielded a break-even price of \$5.20, while the one-pounded scenario produced a break-even price of \$10.40. Generally speaking, these are less than observed retail prices.

Multi-Product Break-Even Price Results

Additional costs were incurred when expanding to a multi-product enterprise that consisted of additional ingredients, equipment, and labor. Given the additional costs, the estimated annual total cost was recalculated using the Dirty-5 procedure. Depreciation was estimated at \$223.98, interest at \$55.99, repairs at \$55.99, and \$300 for insurance. The sum is \$635.97. Using average Oklahoma honey and wax product prices of \$11 for eight-ounce bottles, \$15 for one-pound bottles, \$12 for lotion bars, and \$4 for lip balms, assumed prices were used to create break-even prices as seen in Tables 3-6. For each table, the horizontal axis has the assumed price of honey and the vertical axis has the assumed price of one of the additional products. The value in the table is the break-even price of the other product given the axis values. For example, in the eight-ounce scenario (Table 3), if the producer charges \$11 for eight-ounce bottles of honey and \$4 for lip balms, the break-even price for lotion bars is \$-31.79. This negative break-even price indicates the total cost of production was already covered through the prices of honey and lip balm. In such a scenario, the producer should charge at least the variable cost of the product. Moreover, by pricing the additional product at their local market rate, the producer may realize profits. Table 4 provides evaluation of the eight-ounce lip balm break-even prices. The results are similar. If a producer charges \$11 for eight-ounce bottles of honey and \$12 for lotion bars, the break-even price for lip balms was \$-7.68. Once again, this negative price indicates the producer should look to their market to charge a price reasonable within their area to generate more profit because all costs are already covered.

Next, other multi-product scenarios are examined. These assume one-pound bottles of honey plus lip balms and lotion bars. The one-pound breakeven prices, as seen in Tables 5 and 6, produced some positive (rather than negative) break-even prices. If a producer charged \$13 for one-pound bottles of honey and \$3 per lip balm, lotion bars would need to be sold at \$1.13 to break-even. Assuming producers once again charged \$13 per one-pound bottle and \$10 per lotion bar, the break-even price for lip balms is \$0.63. These break-even prices are well below the observed Oklahoma prices for these additional products. Therefore, once again, the producer has the ability to generate a profit by raising the price of their product above break-even cost yet within the local retail prices.

		Lotion Bar Break-Even						
		8oz Honey Prices						
		8.00	9.00	10.00	11.00	12.00	13.00	14.00
Lip Balm Prices	2.50	-5.33	-12.27	-19.22	-26.16	-33.11	-40.05	-47.00
	3.00	-7.20	-14.15	-21.09	-28.04	-34.98	-41.93	-48.87
	3.50	-9.08	-16.02	-22.97	-29.91	-36.86	-43.80	-50.75
	4.00	-10.95	-17.90	-24.84	-31.79	-38.73	-45.68	-52.62
	4.50	-12.83	-19.77	-26.72	-33.66	-40.61	-47.55	-54.50
	5.00	-14.70	-21.65	-28.59	-35.54	-42.48	-49.43	-56.37
	5.50	-16.58	-23.52	-30.47	-37.41	-44.36	-51.30	-58.25

Table 3: 8 oz. Multi-Product Lotion Bar Break-Even Prices

		Lip Balm Break-Even 8oz Honey Prices						
		8.00	9.00	10.00	11.00	12.00	13.00	14.00
Lotion Bar Prices	9.00	-1.32	-3.17	-5.02	-6.88	-8.73	-10.58	-12.43
	10.00	-1.59	-3.44	-5.29	-7.14	-9.00	-10.85	-12.70
	11.00	-1.85	-3.71	-5.56	-7.41	-9.26	-11.11	-12.97
	12.00	-2.12	-3.97	-5.82	-7.68	-9.53	-11.38	-13.23
	13.00	-2.39	-4.24	-6.09	-7.94	-9.80	-11.65	-13.50
	14.00	-2.65	-4.51	-6.36	-8.21	-10.06	-11.91	-13.77
	15.00	-2.92	-4.77	-6.62	-8.48	-10.33	-12.18	-14.03

Table 4: 8 oz. Multi-Product Lip Balm Break-Even Prices

		Lotion Bar Break-Even 1lb Honey Prices						
		12.00	13.00	14.00	15.00	16.00	17.00	18.00
Lip Balm Prices	2.50	6.48	3.00	-0.47	-3.94	-7.41	-10.88	-14.36
	3.00	4.60	1.13	-2.34	-5.82	-9.29	-12.76	-16.23
	3.50	2.73	-0.75	-4.22	-7.69	-11.16	-14.63	-18.11
	4.00	0.85	-2.62	-6.09	-9.57	-13.04	-16.51	-19.98
	4.50	-1.02	-4.50	-7.97	-11.44	-14.91	-18.38	-21.86
	5.00	-2.90	-6.37	-9.84	-13.32	-16.79	-20.26	-23.73
	5.50	-4.77	-8.25	-11.72	-15.19	-18.66	-22.13	-25.61

Table 5: 1 lb. Multi-Product Lotion Bar Break-Even Prices

		Lip Balm Break-Even 1lb Honey Prices						
		12.00	13.00	14.00	15.00	16.00	17.00	18.00
Lotion Bar Prices	9.00	1.83	0.90	-0.02	-0.95	-1.88	-2.80	-3.73
	10.00	1.56	0.63	-0.29	-1.22	-2.14	-3.07	-4.00
	11.00	1.29	0.37	-0.56	-1.48	-2.41	-3.34	-4.26
	12.00	1.03	0.10	-0.82	-1.75	-2.68	-3.60	-4.53
	13.00	0.76	-0.17	-1.09	-2.02	-2.94	-3.87	-4.80
	14.00	0.49	-0.43	-1.36	-2.28	-3.21	-4.14	-5.06
	15.00	0.23	-0.70	-1.62	-2.55	-3.48	-4.40	-5.33

Table 6: 1 lb. Multi-Product Lip Balm Break-Even Prices

Financial Statement Assessment

When assessing the feasibility from a self-financed cash flow perspective, a cash flow statement, such as that found in Appendix E can be used. These statements were created using average Oklahoma prices where eight-ounce bottles were estimated to be \$11, one-pound bottles estimated at \$15, lotion bars at \$12, and lip balms estimated at \$4. This analysis found that all the scenarios except the single output one-pound scenario remained feasible over a five-year time horizon. The single one-pound scenario's negative cash flow in year one was not outweighed by the positive returns in years two through five. The profitability of these statements, evaluated by income statements seen in Appendix G, showed that the most profitable project was the eight-ounce multi-product scenario. Second most profitable was the eight-ounce single output scenario. Third most profitable was the one-pound multi-product scenario. The one-pound single output scenario did not produce a large enough net income in years two through five to cover the initial negative net income in year one. It is important to note these five-year time frames do not address the time value of money.

Financing these scenarios with a conventional loan produced similar results, with the cash flows, as found in Appendix F, showing feasibility in all scenarios over the five-year time frame except the one-pound single output scenario. Once again, each scenario produced a negative cash flow in year one. These negative values were smaller compared to the self-financed scenario due to the loan spreading the initial investment over the five-year period. Consequently, this also lowered the positive cash flows in years two through five.

For example, seen in Tables 7-9 are the financial statements for the eight-ounce multi-product production that was evaluated as the most feasible scenario. Table 7 is the self-financed cash flow, which details the cash-in per year from each product, versus the cash-out from production and harvesting for each year. The cash outflows include: labor (assumed at \$7.25 per hour), water (assumed at four gallons per additional product based on the average dishwashing cycle), ingredients (listed in appendix B), repairs (assumed at 5% of outlay capital), and insurance (assumed at \$300 per year). The capital cash outflow was also included which comprised of the equipment needed for production and harvesting. Table 8 is the lender-financed cash flow statements that includes all cash inflows and outflows from the self-financed cash flow as well as the addition of an equipment loan in year one, interest payments, and principal payments beginning in year two. Tables 7 and 8 show the difference in cash flow timing when self-financing the project versus financing the project with a conventional loan. The negative cash flow in year one is expected due to the lack of harvesting; however, the self-financed cash flow produced a cash flow of \$-1,649.90, while the lender-financed cash flow was \$-641.98. This \$1000 difference is due to the conventional loan spreading the fixed cost, or initial investment, over the five-year period. This can be evaluated further when looking at the positive cash flows in years two through five, where the self-financed produced cash flows approximately \$328 larger than in the lender-financed version. Table 9 is the income statement for the eight-ounce multi-product scenario. It includes the revenue received from each product as well as the operating expenses incurred for each year. Unlike the cash flow statement, it also includes depreciation expense and evaluates profitability. The income statement for this scenario showed that overall producing eight-

ounce bottles, lotion bars, and lip balms creates a negative return in year one of around \$866, but years two through five had increasing net incomes starting at approximately \$723.

8oz Multi-Product Self-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Lotion bar	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
TOTAL CASH INFLOW	\$ 7,136.00	\$ -	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00
Operating Expenses						
Labor	\$ 743.13	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63
Water	\$ 0.09	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 1,006.58	\$ 25.38	\$ 245.30	\$ 245.30	\$ 245.30	\$ 245.30
Repairs	\$ 279.97	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment	\$ 1,119.89	\$ 1,119.89				
TOTAL CASH OUTFLOW	\$ 4,649.66	\$ 1,649.90	\$ 749.94	\$ 749.94	\$ 749.94	\$ 749.94
Cash Flow Summary						
inflows-outflows	\$ 2,486.34	\$ (1,649.90)	\$ 1,034.06	\$ 1,034.06	\$ 1,034.06	\$ 1,034.06

Table 7: 8 oz. Multi-Product Self-Financed Cash Flow Statement

8oz Multi-Product Lender-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Lotion bar	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
Equipment loan		\$ 1,119.89				
TOTAL CASH INFLOW	\$ 8,255.89	\$ 1,119.89	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00
Operating Expenses						
Labor	\$ 493.00	148.63	\$ 123.25	\$ 123.25	\$ 123.25	\$ 123.25
Water	\$ 0.07		\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 981.21	\$ 25.38	\$ 245.30	\$ 245.30	\$ 245.30	\$ 245.30
Interest payment	\$ 293.28	\$ 111.99	\$ 111.99	\$ 87.86	\$ 61.32	\$ 32.12
Repairs	\$ 223.98	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,200.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment		\$ 1,119.89				
Principal Payment			\$ 241.30	\$ 265.43	\$ 291.98	\$ 321.17
TOTAL CASH OUTFLOW	\$ 6,073.30	\$ 1,761.87	\$ 1,077.86	\$ 1,077.86	\$ 1,077.86	\$ 1,077.86
Cash Flow Summary						
inflows-outflows	\$ 2,182.59	\$ (641.98)	\$ 706.14	\$ 706.14	\$ 706.14	\$ 706.14

Table 8: 8 oz. Multi-Product Lender-Financed Cash Flow Statement

8oz Multi-Product Income Statement						
Revenue	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey Sales	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Lotion Bar Sales	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm Sales	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
Total Revenue	\$ 7,136.00	\$ -	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00
Expenses						
Labor	\$ 641.63	\$ 148.63	\$ 123.25	\$ 123.25	\$ 123.25	\$ 123.25
Water	\$ 0.07	\$ -	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 1,006.58	\$ 25.38	\$ 245.30	\$ 245.30	\$ 245.30	\$ 245.30
Depreciation Expense	\$ 1,119.89	\$ 223.98	\$ 223.98	\$ 223.98	\$ 223.98	\$ 223.98
Interest Expense	\$ 405.27	\$ 111.99	\$ 111.99	\$ 87.86	\$ 61.32	\$ 32.12
Repairs	\$ 279.97	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Total Expenses	\$ 4,953.41	\$ 865.96	\$ 1,060.53	\$ 1,036.40	\$ 1,009.86	\$ 980.66
Net Income	\$ 2,182.59	\$(865.96)	\$ 723.47	\$ 747.60	\$ 774.14	\$ 803.34

Table 9: 8 oz. Multi-Product Income Statement

Discussion

When comparing the eight-ounce and one-pound single product scenarios, producers are faced with vast break-even price differences, with the one-pound breakeven price being double the eight-ounce bottle. However, given that an eight-ounce bottle is half the amount of product, the price difference is expected. Both eight-ounce and one-pound multi-product break-even prices produced negative (below zero) prices in all price scenarios. The exception was the one-pound scenario seeing some positive break-even prices for lotion bars and lip balms. Nevertheless, these break-even prices were below the current market rate.

When assessing the cash flow feasibility, each scenario produces a negative cash flow in year one. This was expected due to the lack of revenue being generating from no harvesting in that year and, at the same time, purchasing all needed equipment and paying operating expenses. When summing the cash-flows over the five-year period, it was found that the one-pound single product scenario may not be feasible for the producer. The relatively small positive cash flows in years two through five, did not offset the initial negative cash flow in year one. Obtaining a conventional loan appeared to make this scenario even less feasible. Loan payments made years two through five resulted in larger negative cash flows.

Evaluation of the income statement showed that this one-pound honey scenario's expected returns did not make it feasible or profitable for a producer given the current market prices. Given that the eight-ounce single product scenario was concluded to be feasible and profitable, the differences may be attributed to the current price differences within the market. When calculating break-even price for honey, it was found that one-

pound bottles should likely be sold at double the cost of eight-ounce bottles; however, that does not reflect current market prices. Currently, producers are receiving more revenue per ounce when selling the eight-ounce bottles, likely due to consumer preference favoring the smaller bottle size.

Beekeeping enterprises are unique because they can be kept in small urban environments, or be a small component of a farm, and have limited start-up costs compared to other enterprises. Backyard poultry is another enterprise that can be produced small scale in some urban areas or expanded for commercial production. Some comparison and contrast of both of these enterprises is presented in Appendix H.

CHAPTER V

CONCLUSION

This analysis sought to educate bee producers on how to price their honey and wax products as well as provide a financial assessment for different potential scenarios they may choose to pursue. The break-even prices obtained for each scenario showcase the minimum price needed to cover the cost of production. Financing each of these projects can aid in spreading the initial investment over a longer period to aid with the timing of cash flows. The cash flow and income statements give producers insight on the timing of cash flows and the profitability of the project. It was found that eight-ounce single and multi-product scenario were more profitable compared to the one-pound scenarios. The one-pound single output scenario was not feasible with current average market prices. Although this analysis is subject to current expenses, prices, and the amount of output harvested each year, these tools allow for producers to budget the cost of their production to create a cost-effective enterprise. This research resulted in a downloadable spreadsheet where producers may input their own costs and prices to aid them in decision-making for their personal enterprise. Further research on the optimal use of wax could help optimize the byproducts of production to make the enterprise more profitable. Additionally, further evaluation of other extensions of beekeeping, such as

producing bees to sell to other producers and pollination contracts, could aid producers in assessing the feasibility and profitability of other ways to expand their enterprise.

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APPENDICES

APPENDIX A: HARVESTING HONEY

The first stage in harvesting honey is determining when and how much to harvest from your hive. Within the first year of establishing your beehive, you are unlikely to collect a significant amount of surplus honey—surplus honey refers to the honey you are able to take from the hive for your use. Your bees need time to forage and build their population. You may not harvest any honey your first year.

In order to keep your hive thriving, some of the honey your bees produce will need to remain in their hive for their own use during the winter when there is no pollen or nectar. In climates with colder weather, it is recommended to leave approximately 60 to 70 pounds of honey. In climates with little to no cold season it is recommended to leave 20 to 30 pounds (Blackiston, 2020). Estimating this will depend on your frame size, with Langstroth deep frames estimated to produce six pounds of honey, medium frames producing four pounds, and shallow frames estimated to yield three pounds of honey per frame. For better accuracy, you can weigh frames with a portable scale. Determining when to harvest your honey can vary depending on the climate and nectar flow within your area. A frame can be harvested when filled 80 percent or more with wax capped honey.

Once you have determined your frames have been filled with honey, capped, and the nectar flow season has been completed you can begin the process of extracting liquid honey.

There are many methods for extracting honey. Safety is important. Be sure to wear a beekeeping suit or protect yourself in some manner. Depending on your personal preference, you may opt for a full beekeeping suit, or just gloves and a beekeeping veil with thick clothes that cover all of your skin (Bir et al. 2021). First, you will need to remove the frames from the hive. You can use smoke to calm the bees and gently shake and brush them from the frame. If you find this method difficult, another option is to use bee escape boards or repellent to lure the bees out.

Once you have removed the frames you are extracting from, you will need to uncapping the honey with an uncapping knife before placing it in the extractor. Electric uncapping knives are widely used to get a precise clean cut; however, a cold serrated uncapping knife dipped in hot water can be used as an affordable option. Starting a quarter from the bottom of the frame, using a side-to-side slicing motion, begin to remove the capped cells from the frame. Gradually move the knife up the frame until you have removed the upper half of the capped cells. Once you have exposed the cells of honey from the upper section, return to the bottom quarter of the frame and using a downward slice, cut the bottom quarter of capped cells off the frame. Flip the frame over and repeat the process on the opposite side. Finish by uncapping any missed cells with an uncapping scratcher.

Place uncapped frames vertically in your honey extractor. Extractors come in numerous styles, sizes, and price ranges. Motorized extractors can be purchased to make

the process less labor intensive; however, manually spun extractors are an affordable option. Once you have placed the top on your extractor, begin to slowly spin the frames and gradually increase the speed. Spin for 10 to 12 minutes flipping the frame to the opposite side at the halfway point.

Once the extractor has been filled with honey it can be drained into a bottling bucket through a sieve or fine kitchen strainer. This step ensures your honey is free of wax or other contaminants before bottling. After straining, allow the honey to rest for an hour in the bottling bucket to let air bubbles rise to the top.

After resting, your honey is ready to be bottled into the container of your choice. Containers can range from jars to plastic bottles. The key element to bottling is making sure your container has been sanitized and is airtight to prevent bacteria. Run your containers through a hot cycle in your dishwasher and allow them to completely dry before filling them. Glass jars can be placed in your oven on low for 15 to 20 minutes in order to speed up the drying process (Blackiston, 2020).

It is important to note that honey production can change from year-to-year. Honey production is dependent on your management strategies, the health of the hive, and things that are out of your control, such as the weather. The products you may choose to sell also depend on your management strategy. The wax capping removed in the harvesting process can be used, sold, or made into new products. Many beekeepers keep all of the wax harvested for use in their own hives. Wax is valuable to help bees start on new frames. If you have sufficient wax, you may choose to sell wax in blocks to other beekeepers. Further processing your wax can allow you to create creams, candles, and natural cosmetics.

APPENDIX B: LIP BALM AND LOTION BARS

Wax, a byproduct of honey production, has many valuable uses. Wax can be further processed to make things such as candles, lotion bars, lip balm and much more. In this analysis, lotion bars and lip balm were used as additional products in the multi-production scenario. Both of these products are popular among producers and are relatively simple to make. A simple internet search gives numerous options on how to customize both of these products to fit a wide variety of tastes.

To make one batch of lotion bars, yielding approximately six bars, you will need 3.5 ounces of olive oil, 3.5 ounces of shea butter, 2.5 ounces of wax, 3 milliliters of essential oil or your fragrance of choice, and a 6-cavity silicone wax mold. In a heat safe container, combine the olive oil and wax and microwave in 30-60 second increments until completely melted. Once melted, add your shea butter and stir until incorporated. If needed, place back into the microwave in 15-20 second increments until all of the ingredients are fully melted. After adding in the essential oils, the molds are ready to be filled. Allow the bars to set in a cool place overnight to solidify (Berry, 2016).

The lip balm recipe yields approximately 18 tubes of lip balm. To make the lip balms you will need: 2 ounces of beeswax, 2 ounces of shea butter, 1 tbsp of coconut oil, 40 drops of essential oil, and empty lip balm tubes. Combine the beeswax, coconut oil, and shea butter in a double boiler and heat for ten minutes or until completely melted. Remove from the heat and add the essential oils. Carefully pour the mixture into the empty lip balm containers and allow to cool for 30 minutes before putting on the cap

(Choi, 2019).

APPENDIX C: LABELING LAWS AND LIABILITY

Prior to starting a bee enterprise, it is important to assess your state and local ordinances. The Oklahoma Apiary Act (2005) prohibits Oklahoma communities from banning bee enterprises within city limits, allowing for urban production. To sell your honey in compliance with Oklahoma law, your enterprise must fulfill the following requirements: you have produced less than 500 gallons of honey within the year, your hives are located within the state of Oklahoma, and your honey is raw and has not been altered with other products. In order to sell bottled honey, your containers must have a common food product name, the net weight of honey, the beekeeper's name, your ten-digit phone number, the address of where it was produced, and the statement "Bottled or packaged in a facility not inspected by the Oklahoma Department of Health".

The FDA has guidelines for cosmetic labeling. It is important to note that if your cosmetics alter the structure or function of the body, such as sunscreen, they are also considered a drug and have additional labeling requirements. The ingredients used in the lotion bar and lip balms created in this analysis are solely cosmetic. Additional information on the font size of each description and when to add additional labeling can be found on the FDA's cosmetic labeling guide as seen in the figure below (Center for Food Safety and Applied Nutrition, 2022).

Placement of Information on Labels

Outer Container (Or Label of Single Container Product)

Principal Display Panel:	Information Panels:
Name of product	Directions for safe use
Identity	Warnings
§ 740.10 warning	Name and place of business
Net quantity of contents	Ingredient declaration
	Any other required information

FDA Labeling Guide

The cosmetic product label should include a principal display panel and information panel. The FDA's example of these display contents can be found in the appendices. The principal display label may be put on outside packaging if it was being placed in a container holding the product. The display panel should include: the name of the product, identification of the product or its intended use, a warning label for miss intended use, and the net quantity of ingredients. The information panel is to be printed directly on the product. The information panel must include directions for safe use, warnings, name and address of business, and a list of ingredients ordered by prominence (Center for Food Safety and Applied Nutrition, 2022).

As a producer, it is important to remember the liability you face when selling your products, specifically at Farmer's Markets. Farmer's Market insurance is a great way to

combat legal repercussions and protect personal property. There are numerous options when it comes to insurance plans that can be found by calling local insurance companies or doing a search online. The ideal way to protect your enterprise is finding an insurance plan that suits the income of your operation as well as the coverage for the liability you may encounter. This analysis used Flip's Farmers market insurance estimated to cost 300 dollars a year. This plan provides general liability of up to \$2,000,000, \$2,000,000 in product liability, one million dollars in personal and advertising injury, \$300,000 in damages to rented premises, \$300,000 in workers compensation, and \$5,000 in business personal property ((Farmers Market Vendor Insurance, n.d.).

APPENDIX D: MARKETING

Once you have completed the harvesting process and have filled your correctly labeled containers your honeybee products are ready to be sold. There are numerous ways to sell your products. To begin establish a presence in your community—tell your friends, neighbors, and coworkers about your enterprise. Word of mouth can be a great tool in creating familiarity of your products. Attend and sell your products at Farmer’s Markets. Farmers Markets give you a great opportunity to interact face-to-face with customers and gives you the chance to explain the unique process behind your products.

Social media pages are another great way to get people invested in your project. Not only can you create interest by documenting and informing your customers about your hive, but they will also have an easy way to contact you about your products. As your production begins to grow, creating a website where customers can place orders can allow for you to expand your customer base outside of your local area.

APPENDIX E: SELF-FINANCED CASH FLOW STATEMENTS

8oz Single Self-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
TOTAL CASH INFLOW	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Operating Expenses						
Labor	\$ 543.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.03	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 720.00	\$ -	\$ 180.00	\$ 180.00	\$ 180.00	\$ 180.00
Repairs	\$ 269.80	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment	\$ 1,079.20	\$ 1,079.20				
TOTAL CASH OUTFLOW	\$ 4,112.78	\$ 1,541.92	\$ 642.72	\$ 642.72	\$ 642.72	\$ 642.72
Cash Flow Summary						
inflows-outflows	\$ 1,167.22	\$ (1,541.92)	\$ 677.28	\$ 677.28	\$ 677.28	\$ 677.28

Eight-Ounce Single Product Self-Financed Cash Flow Statement

1lb Single Self-Financed Cash Flow Statement

Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
1lb Honey Sales	\$ 3,600.00	\$ -	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
TOTAL CASH INFLOW	\$ 3,600.00	\$ -	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Operating Expenses						
Labor	\$ 543.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.03	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 576.00	\$ -	\$ 144.00	\$ 144.00	\$ 144.00	\$ 144.00
Repairs	\$ 269.80	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment	\$ 1,079.20	\$ 1,079.20				
TOTAL CASH OUTFLOW	\$ 3,968.78	\$ 1,541.92	\$ 606.72	\$ 606.72	\$ 606.72	\$ 606.72
Cash Flow Summary						
inflows-outflows	\$ (368.78)	\$(1,541.92)	\$ 293.28	\$ 293.28	\$ 293.28	\$ 293.28

One-Pound Single Product Self-Financed Cash Flow Statement

8oz Multi-Product Self-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Lotion bar	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
TOTAL CASH INFLOW	\$ 7,136.00	\$ -	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00
Operating Expenses						
Labor	\$ 743.13	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63
Water	\$ 0.09	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 1,006.58	\$ 25.38	\$ 245.30	\$ 245.30	\$ 245.30	\$ 245.30
Repairs	\$ 279.97	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment	\$ 1,119.89	\$ 1,119.89				
TOTAL CASH OUTFLOW	\$ 4,649.66	\$ 1,649.90	\$ 749.94	\$ 749.94	\$ 749.94	\$ 749.94
Cash Flow Summary						
inflows-outflows	\$ 2,486.34	\$ (1,649.90)	\$ 1,034.06	\$ 1,034.06	\$ 1,034.06	\$ 1,034.06

Eight-Ounce Multi-Product Self-Financed Cash Flow Statement

1lb Multi-Product Self-Financed Cash Flow Statement

Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
1lb Honey	\$ 3,600.00	\$ -	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Lotion bar	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
TOTAL CASH INFLOW	\$ 5,456.00	\$ -	\$ 1,364.00	\$ 1,364.00	\$ 1,364.00	\$ 1,364.00
Operating Expenses						
Labor	\$ 743.13	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63
Water	\$ 0.09	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
ingredients	\$ 862.58	\$ 25.38	\$ 209.30	\$ 209.30	\$ 209.30	\$ 209.30
Repairs	\$ 279.97	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment	\$ 1,119.89	\$ 1,119.89				
TOTAL CASH OUTFLOW	\$ 4,505.66	\$ 1,649.90	\$ 713.94	\$ 713.94	\$ 713.94	\$ 713.94
Cash Flow Summary						
inflows-outflows	\$ 950.34	\$ (1,649.90)	\$ 650.06	\$ 650.06	\$ 650.06	\$ 650.06

One-Pound Multi-Product Self-Financed Cash Flow Statement

APPENDIX F: LENDER-FINANCED CASH FLOW STATEMENTS

8oz Single Lender-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Equipment loan		\$ 1,079.20				
TOTAL CASH INFLOW	\$ 6,359.20	\$ 1,079.20	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Operating Expenses						
Labor	\$ 435.00	108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.02	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 720.00	\$ -	\$ 180.00	\$ 180.00	\$ 180.00	\$ 180.00
Interest payment	\$ 282.62	\$ 107.92	\$107.92	\$84.67	\$59.09	\$30.95
Repairs	\$ 215.84	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$ 1,200.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment		\$ 1,079.20				
Principal Payment			\$232.54	\$255.79	\$281.37	\$309.51
TOTAL CASH OUTFLOW	\$ 5,582.52	\$ 1,649.84	\$ 983.17	\$ 983.17	\$ 983.17	\$ 983.17
Cash Flow Summary						
inflows-outflows	\$ 776.68	\$ (570.64)	\$ 336.83	\$ 336.83	\$ 336.83	\$ 336.83

Eight-Ounce Single Product Lender-Financed Cash Flow Statement

1lb Single Lender-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
1lb Honey Sales	\$ 3,600.00	\$ -	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Equipment loan		\$ 1,079.20				
TOTAL CASH INFLOW	\$ 4,679.20	\$ 1,079.20	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Operating Expenses						
Labor	\$ 435.00	108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.02	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 576.00	\$ -	\$ 144.00	\$ 144.00	\$ 144.00	\$ 144.00
Interest payment	\$ 282.62	\$ 107.92	\$107.92	\$84.67	\$59.09	\$30.95
Repairs	\$ 215.84	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$ 1,200.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment		\$ 1,079.20				
Principal Payment			\$232.54	\$255.79	\$281.37	\$309.51
TOTAL CASH OUTFLOW	\$ 5,438.52	\$ 1,649.84	\$ 947.17	\$ 947.17	\$ 947.17	\$ 947.17
Cash Flow Summary						
inflows-outflows	\$ (759.32)	\$ (570.64)	\$ (47.17)	\$ (47.17)	\$ (47.17)	\$ (47.17)

One-Pound Single Product Lender-Financed Cash Flow Statement

8oz Multi-Product Lender-Financed Cash Flow Statement						
Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Lotion bar	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
Equipment loan		\$ 1,119.89				
TOTAL CASH INFLOW	\$ 8,255.89	\$ 1,119.89	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00
Operating Expenses						
Labor	\$ 493.00	148.63	\$ 123.25	\$ 123.25	\$ 123.25	\$ 123.25
Water	\$ 0.07		\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 981.21	\$ 25.38	\$ 245.30	\$ 245.30	\$ 245.30	\$ 245.30
Interest payment	\$ 293.28	\$ 111.99	\$111.99	\$87.86	\$61.32	\$32.12
Repairs	\$ 223.98	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,200.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment		\$ 1,119.89				
Principal Payment			\$241.30	\$265.43	\$291.98	\$321.17
TOTAL CASH OUTFLOW	\$ 6,073.30	\$ 1,761.87	\$ 1,077.86	\$ 1,077.86	\$ 1,077.86	\$ 1,077.86
Cash Flow Summary						
inflows-outflows	\$ 2,182.59	\$ (641.98)	\$ 706.14	\$ 706.14	\$ 706.14	\$ 706.14

Eight-Ounce Multi-Product Lender-Financed Cash Flow Statement

1lb Multi-Product Lender-Financed Cash Flow Statement

Cash Received from Operations	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
1lb Honey Sales	\$ 3,600.00	\$ -	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Lotion bar	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
Equipment loan		\$ 1,119.89				
TOTAL CASH INFLOW	\$ 6,575.89	\$ 1,119.89	\$ 1,364.00	\$ 1,364.00	\$ 1,364.00	\$ 1,364.00
Operating Expenses						
Labor	\$ 594.50	148.63	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63
Water	\$ 0.07	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 837.21	\$ 25.38	\$ 209.30	\$ 209.30	\$ 209.30	\$ 209.30
Interest payment	\$ 293.28	\$ 111.99	\$111.99	\$87.86	\$61.32	\$32.12
Repairs	\$ 223.98	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,200.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Capital Expenses						
Equipment		\$ 1,119.89				
Principal Payment			\$241.30	\$265.43	\$291.98	\$321.17
TOTAL CASH OUTFLOW	\$ 6,030.81	\$ 1,761.89	\$ 1,067.23	\$ 1,067.23	\$ 1,067.23	\$ 1,067.23
Cash Flow Summary						
inflows-outflows	\$ 545.07	\$ (642.00)	\$ 296.77	\$ 296.77	\$ 296.77	\$ 296.77

One-Pound Multi-Product Lender-Financed Cash Flow Statement

APPENDIX G: INCOME STATEMENTS

8oz Single Income Statement						
Revenue	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey Sales	\$5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Total Revenue	\$5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Expenses						
Labor	\$ 543.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.03	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 720.00	\$ -	\$ 180.00	\$ 180.00	\$ 180.00	\$ 180.00
Depreciation Expense	\$1,079.20	\$ 215.84	\$ 215.84	\$ 215.84	\$ 215.84	\$ 215.84
Interest Expense	\$ 390.54	\$ 107.92	\$107.92	\$84.67	\$59.09	\$30.95
Repairs	\$ 269.80	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Total Expenses	\$4,503.32	\$ 786.48	\$ 966.48	\$ 943.22	\$ 917.64	\$ 889.51
Net Income	\$ 776.68	\$(786.48)	\$ 353.52	\$ 376.78	\$ 402.36	\$ 430.49

Eight-Ounce Single Product Income Statement

1lb Single Income Statement						
Revenue	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
1lb Honey Sales	\$ 3,600.00		\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Total Revenue	\$ 3,600.00	\$ -	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Expenses						
Labor	\$ 543.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75	\$ 108.75
Water	\$ 0.03	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01	\$ 0.01
Ingredients	\$ 576.00	\$ -	\$ 144.00	\$ 144.00	\$ 144.00	\$ 144.00
Depreciation Expense	\$ 1,079.20	\$ 215.84	\$ 215.84	\$ 215.84	\$ 215.84	\$ 215.84
Interest Expense	\$ 390.54	\$ 107.92	\$ 107.92	\$ 84.67	\$ 59.09	\$ 30.95
Repairs	\$ 269.80	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96	\$ 53.96
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Total Expenses	\$ 4,359.32	\$ 786.48	\$ 930.48	\$ 907.22	\$ 881.64	\$ 853.51
Net Income	\$ (759.32)	\$ (786.48)	\$ (30.48)	\$ (7.22)	\$ 18.36	\$ 46.49

One-Pound Single Product Income Statement

8oz Multi-Product Income Statement						
Revenue	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
8oz Honey Sales	\$ 5,280.00	\$ -	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00	\$ 1,320.00
Lotion Bar Sales	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm Sales	\$ 1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
Total Revenue	\$ 7,136.00	\$ -	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00	\$ 1,784.00
Expenses						
Labor	\$ 641.63	\$ 148.63	\$ 123.25	\$ 123.25	\$ 123.25	\$ 123.25
Water	\$ 0.07	\$ -	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 1,006.58	\$ 25.38	\$ 245.30	\$ 245.30	\$ 245.30	\$ 245.30
Depreciation Expense	\$ 1,119.89	\$ 223.98	\$ 223.98	\$ 223.98	\$ 223.98	\$ 223.98
Interest Expense	\$ 405.27	\$ 111.99	\$ 111.99	\$ 87.86	\$ 61.32	\$ 32.12
Repairs	\$ 279.97	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$ 1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Total Expenses	\$ 4,953.41	\$ 865.96	\$ 1,060.53	\$ 1,036.40	\$ 1,009.86	\$ 980.66
Net Income	\$ 2,182.59	\$ (865.96)	\$ 723.47	\$ 747.60	\$ 774.14	\$ 803.34

Eight-Ounce Multi-Product Income Statement

1lb Multi-Product Income Statement						
Revenue	Totals	Year 1	Year 2	Year 3	Year 4	Year 5
1lb Honey Sales	\$3,600.00	\$ -	\$ 900.00	\$ 900.00	\$ 900.00	\$ 900.00
Lotion Bar Sales	\$ 816.00	\$ -	\$ 204.00	\$ 204.00	\$ 204.00	\$ 204.00
Lip Balm Sales	\$1,040.00	\$ -	\$ 260.00	\$ 260.00	\$ 260.00	\$ 260.00
Total Revenue	\$5,456.00	\$ -	\$1,364.00	\$1,364.00	\$1,364.00	\$1,364.00
Expenses						
Labor	\$ 743.13	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63	\$ 148.63
Water	\$ 0.09	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02	\$ 0.02
Ingredients	\$ 862.58	\$ 25.38	\$ 209.30	\$ 209.30	\$ 209.30	\$ 209.30
Depreciation Expense	\$1,119.89	\$ 223.98	\$ 223.98	\$ 223.98	\$ 223.98	\$ 223.98
Interest Expense	\$ 405.27	\$ 111.99	\$111.99	\$87.86	\$61.32	\$32.12
Repairs	\$ 279.97	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99	\$ 55.99
Insurance	\$1,500.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00	\$ 300.00
Total Expenses	\$4,910.93	\$ 865.98	\$1,049.91	\$1,025.78	\$ 999.23	\$ 970.03
Net Income	\$ 545.07	\$(865.98)	\$ 314.09	\$ 338.22	\$ 364.77	\$ 393.97

One-Pound Multi-Product Income Statement

APPENDIX H: BACKYARD BEEKEEPING VERSUS BACKYARD POULTRY

Both backyard beekeeping and backyard poultry have smaller startup costs, with poultry needing housing, feeders, a drinker, heat source, and thermometer (Bir and Zook, 2021). However, where they differ is the variable costs and time associated with upkeep. Unlike bees, whose hives need to be checked approximately every two weeks, chickens must be fed daily, and bedding must be replaced frequently. According to an example startup budget by Penn State (2020) a 50-bird enterprise had a total cost of \$3,530.19, which largely comprised of variable costs that summed to \$2,854.33 (Kime and Phenicie, 2020). Beekeeping and honey harvesting had much smaller total costs of production, where the multi-product eight-ounce scenario was estimated to cost \$1,513.83. It is important to note that each of these budgets used assumed prices and cost, both of which can change from year to year. Although the profitability of each of these enterprises is subjective to change, bee enterprises remain less labor intensive when compared to poultry. However, there is likely more production variability in bees. Longer term studies comparing the two enterprises would help further evaluate potential risks.

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