



EXTENSION



AGRICULTURAL ECONOMICS
for High School Ag Classrooms
E-1061

Agricultural Economics for High School Ag Classrooms

by

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Module 1. Farm Business Planning

Enterprise Budgets

Cash Flow Budgets

Balance Sheets

Oklahoma State University

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For use in Oklahoma high schools

Note to instructors

These materials were developed by Eric A. DeVuyst and Suhina Deol. The materials in this document can be used as a stand-alone section on agricultural economics or integrated into a course/section on animal science. Each section contains a problem set. The problem sets are based on a common case study. An answer key is provided with each problem set. The keys can be distributed to students if desired or withheld for use by the instructor. Supplemental problems and answer keys for each section are provided at the end of this document. The supplemental problems can be used in class, as take-home assignments or as quiz and exam questions.

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Note on use:

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Agricultural economics case study

Farm business planning

Student learning objectives

As a result of this lesson the student will:

- Develop an enterprise budget and compute breakeven production and price
- Develop a cash flow budget
- Develop and analyze a balance sheet

Instruction time

Each section will take one to two class periods or 80 minutes to complete.

Tools, equipment and supplies

- Exercises 1, 2, 3, and 4 – one each per student (or group)
- Supplemental problems (optional) – each per student (or group)

Additional resources

Beginning farmer loan program

- AGEC 2001 - Overview of opportunities for beginning farmers and ranchers
extension.okstate.edu/fact-sheets/overview-of-opportunities-for-beginning-farmers-and-ranchers.html
- FSA beginning farmer loans

Budgeting

- AGEC 139 - Budget: their use in farm management
extension.okstate.edu/fact-sheets/budgets-their-use-in-farm-management.html

Cash flow planning

- AGEC 751 - Developing a cash flow plan
extension.okstate.edu/fact-sheets/developing-a-cash-flow-plan.html

Balance sheets

- AGEC 752 - Developing a balance sheet
extension.okstate.edu/fact-sheets/developing-a-balance-sheet.html

CASE STUDY INTRODUCTION

Megan is a freshman studying agriculture in an Oklahoma high school. A year ago, her grandparents gave her a weaned heifer. She showed her heifer at several shows and saved her premium checks. Megan would like to build a small breeding herd. By combining money from part-time summer jobs and her premium checks, she has saved \$500 to put toward the purchase of a bred cow. Megan's parents currently let her graze her heifer at no cost, so she has avoided paying most production expenses. Though grazing is free, she does pay for feed and veterinary expenses on her heifer. Her FFA advisor, Mr. Blake, encouraged her to continue to develop this small production into a cattle Supervised Agricultural Experience (SAE). He recommended that she start keeping financial and production records. He gave her a copy of the SAE Record Keeping Activity booklet as a starting point.

To finance the investment in a bred cow, Megan will need to take out a youth farmer loan. She will also need to take out an operating loan to pay for feed and veterinary expenses. The bank's loan officer told Megan in order to be considered for a loan, she must organize a business plan.

Specifically, Megan will need to provide:

1. An enterprise budget
2. A cash flow budget
3. A balance sheet

More information

Oklahoma Farmer Loan Program

To see this packet, visit the link below or scan the QR code:

fsa.usda.gov/resources/beginning-farmers-and-ranchers-loans



ENTERPRISE BUDGETS

An enterprise budget is used to determine if an activity appears to be profitable or economically advisable. It projects all revenue and expenses that can be allocated to a given economic activity, such as cow-calf production, wheat stockers, meat goats, wheat, corn, soybeans, etc. Enterprise budgets are used to project the economic advisability (or returns to unpaid labor, management and equity capital) of a given enterprise, production practice or marketing plan. An example enterprise budget for cow-calf production is presented in Table 1. Additional budgets for other Oklahoma commodities are included in this packet.

A budget is usually built on an annual basis—that is, it includes all income/revenues, and expenses that are expected to be incurred in a calendar year. Revenues include product sales, such as calves sold or bushels of wheat sold, but also include the increase (or decrease) in the value of inventories of salable products and the increase the value of gifted or raised breeding livestock. So, some revenues are “non-cash.” Similarly, expenses include cash purchases of feed and veterinary supplies but also the decrease (or increase) in value of feed and supply inventories. An additional non-cash expense is depreciation. Depreciation is the loss in economic value of durable (long-lived) assets due to wear and tear, age or becoming outdated.

Enterprise budgets can be used to compare the returns to unpaid labor, management and capital from competing enterprises. Enterprise budgets can also be used to compute the level of production needed to breakeven. That is, how much must be produced so that the total revenue equals the total expenses (returns to unpaid labor, management and capital equals zero). ?

Breakeven production or output is computed as:

Breakeven output = Total expense / sale price

Breakeven sale price* is computed as:

Breakeven sale price = Total expense / output

More information

Enterprise Budgeting

To learn more about how to use budgets for your farm business, see this packet or scan the QR codes:



AGEC-139



AGEC-243

Table 1

Enterprise budget

Example enterprise budget: cow-calf operation

| REVENUE | |
|---------------------------------------------|------------|
| Calf sales | |
| Gain (loss) on cull cow and bull sales | |
| Change in accounts receivable | |
| Increase in base revenue of raised breeding | |
| Livestock | |
| Total revenue | (A) |

| EXPENSES | |
|---------------------------------------------------------------|--------------|
| Feed purchases | |
| Grazing expenses | |
| Veterinary expenses | |
| Utilities | |
| Hired labor | |
| Other cash expenses | |
| Depreciation | |
| Change in supply inventory and prepaid expenses | |
| Operating interest | |
| Interest in long-term debt | |
| Total expenses | (B) |
| | |
| Returns to unpaid labor, management and equity capital | (A-B) |

Farm business management

Case study exercise 1

To demonstrate how an enterprise budget is constructed, return to Megan's SAE project. She currently owns a heifer and is looking to purchase a bred 3-year-old cow. Because her parents let her graze her cattle at no charge, she will only be paying for purchased feeds and veterinary supplies. She plans to purchase a bred cow in January that will calve in February. The calf will be weaned when it is 6 months old in October and sold in December. The calf will need an ear tag (\$1), two rounds of vaccinations ($\$4 \times 2$) and 45 days of feed after weaning. (This 45-day period is called preconditioning). During preconditioning, the calf will receive 4 pounds per day of a mixed ration (12 cents per pound) and graze native pasture. After preconditioning, Megan expects to sell a 630-pound calf at \$1.10 per pound.

The bred cow will cost \$750 with \$250 borrowed to make the purchase. Megan expects to own the cow for another seven years. After seven years, the cow will be culled with an expected value of \$470. The cow will need to be fed prairie hay and 20% protein range cubes for 90 days. On a daily basis, the cow will consume 30 pounds of hay at \$50 per ton and 2 pounds of range cubes at \$230 per ton.

As she intends to show heifer at her local, county and district livestock shows, Megan will need to keep her heifer in good body condition. So, she will feed her heifer 8 pounds of textured or "sweet" feed (13.5% protein and 4% fat) for 120 days. Sweet feed costs \$9 per 50 pounds or 18 cents per pound. To assist with grooming and show preparation, Megan recently purchased a blower for \$300. (A blower is basically a large hair dryer/fan).

Both the bred cow and heifer will need booster vaccinations (\$4 each). Control of parasites will cost \$4 for each of the breeding animals and \$2 for the calf.

Use the information discussed above to fill in the enterprise budget (Exercise 1 worksheet). You will need to compute the annual depreciation on the purchased cow and the blower. (Note, do not take depreciation on raised or gifted breeding livestock). Annual depreciation is computed as $(\text{purchase cost} - \text{salvage value}) / \text{useful life}$. Salvage value is just the value at culling of the bred cow or resale value of the blower at the end of Megan's project. In this case, assume the blower was purchased for \$300, has a salvage value of \$200 and has a five-year useful life.

You also will need to know the increase in value for her heifer. The increase in value is expected to be \$180. Finally, Megan does not carry an inventory of feed or other supplies.

Megan will pay 5% interest on the note used to purchase the bred cow and 5% on her operating note.

To estimate operating interest, multiply total cash expense (including interest) by the interest rate (5%) and divide by 2 or:

Operating interest = cash expenses + interest rate / 2

Exercise 1

Matching Worksheet

Name: _____ Date: _____

Directions: Use the information in Exercise 1 to fill in the table below. (Some spaces will remain blank). Be sure to answer the questions on the next page about Megan's SAE project.

| REVENUE | CALF | COW | HEIFER | TOTAL |
|-------------------------------------------|------|-----|--------|------------|
| Calf sales | | | | |
| Gain (loss) on cull cow and bull sales | | | | |
| Change in accounts receivable | | | | |
| Increase in base value of raised breeding | | | | |
| Livestock | | | | |
| Total Revenue | | | | (A) |

| EXPENSES | CALF | COW | HEIFER | TOTAL |
|---------------------------------------------------------------|------|-----|--------|--------------|
| Feed purchases | | | | |
| Grazing expenses | | | | |
| Veterinary expenses | | | | |
| Utilities | | | | |
| Hired labor | | | | |
| Other cash expenses | | | | |
| Depreciation | | | | |
| Change in supply inventory and prepaid expenses | | | | |
| Operating interest | | | | |
| Interest on long-term debt | | | | |
| Total Expenses | | | | (B) |
| | | | | |
| Returns to Unpaid Labor, Management and Equity Capital | | | | (A-B) |

Name: _____ Date: _____

1. **Determine if Megan's SAE project appears to be profitable.**
 - a. If Megan expects to sell a 630-pound calf, what price will she need to receive in order to breakeven?
 - b. If her calf weighs 600 pounds, what is the breakeven price?
 - c. If her calf weighs 660 pounds, what is the breakeven price?

2. **Determine how much Megan's calf needs to weigh in order to breakeven given the following prices per pound.**
 - a. What is the breakeven weight if the calf is sold for \$1.10 per pound?
 - b. At \$1 per pound?
 - c. At \$1.20 per pound?

3. **To date, Megan has not had to pay for grazing. If her parents charged her \$6 per month for grazing for both the heifer and cow (a total of \$12 per month):**
 - a. How would her net return change?
 - b. How would her breakeven weights change?
 - c. How would her breakeven sale prices change?

Megan will have two revenues, one cash and one non-cash. First, she will sell her weaned calf for \$693 (cash). Second, the base value of her heifer will increase by \$180 (non-cash). Both the cash and non-cash revenues are entered in Table 2.

Feed expenses include \$172.80 for the heifer, \$88.20 for the cow and \$21.60 for the weaned calf. Veterinary expenses include vaccinations (\$4 for the heifer, \$4 for the purchased cow and \$8 for the calf) and parasite control (\$4 for the heifer, \$4 for the cow and \$2 for the calf). The other cash expense is \$1 for the calf ear tag. Depreciation is taken on the purchased cow and the blower. The cow depreciation is computed as $(\$750 - \$470)/7 = \$40$ per year. The blower depreciation is computed as $(\$300 - \$200)/5 = \$20$. Interest on operating is calculated by summing up cash operating expense (i.e., no depreciation). These items total to \$309.60. Multiply by the interest rate of 5% (0.05) and divide by 2 to get the expected operating interest of \$7.74. Next, interest on the cow note is computed as \$12.50 ($=\250×0.05). Megan's project is budgeted to have positive returns to unpaid labor, management and equity capital. So, it is likely to be profitable.

To compute breakeven sale price, divide the total expenses of \$390 (rounded to the nearest dollar) by the expected sale weight of 630 pounds or $\$390/630$ pounds = \$0.62 per pound. If the calf weighs 600 pounds, the breakeven price is $\$390/600 = \0.65 per pound. At 660 pounds, $\$390/660 = \0.59 per pound.

To compute breakeven production or output, divide the total expense of \$390 by the expected sale price of \$1.10 or $\$390/\1.10 per pound = 355 pounds. If the sale price is \$1, $\$390/\1 per pound = 390 pounds. At \$1.20 per pound, $\$390/\1.20 per pound = 325 pounds.

| REVENUE | CALF | COW | HEIFER | TOTAL |
|-------------------------------------------|--------|-----|-----------|--------------------------|
| Calf sales | \$ 693 | — | — | \$ 693 |
| Gain (loss) on cull cow and bull sales | — | — | — | — |
| Change in accounts receivable | — | — | — | — |
| Increase in base value of raised breeding | — | — | \$ 180.80 | \$ 180.80 |
| Livestock | — | — | — | — |
| Total Revenue | | | | \$ 873.80 (A) |

| EXPENSES | CALF | COW | HEIFER | TOTAL |
|---------------------------------------------------------------|-------|-------|-----------|----------------------------|
| Feed purchases | \$ | \$ | \$ 172.80 | \$ 282.60 |
| Grazing expenses | — | — | — | — |
| Veterinary expenses | \$ 10 | \$ 8 | \$ 8 | \$ 26 |
| Utilities | — | — | — | — |
| Hired labor | — | — | — | — |
| Other cash expenses | \$ 1 | — | — | \$ 1 |
| Depreciation | — | \$ 40 | \$ 20 | \$ 60 |
| Change in supply inventory and prepaid expenses | | | | |
| Operating interest | | | | \$ 7.74 |
| Interest on long-term debt | | | | \$ 12.50 |
| Total Expenses | | | | \$ 389.84 (B) |
| | | | | |
| Returns to Unpaid Labor, Management and Equity Capital | | | | \$ 483.16 (A-B) |

CASH FLOW BUDGETS

Next, Megan needs to develop a cash flow budget. The cash flow budget is used to identify time periods where cash is deficit (or surplus). Where the enterprise budget is used to project the economic advisability of an enterprise, cash flow budgets project the feasibility of an enterprise. That is, can this enterprise “work” for the business? The cash flow budget lists all sources of cash, including beginning cash balance, crop sales, livestock sales, capital asset sales, and all uses of cash, including cash expenses, purchases of land and purchases of depreciable assets (buildings, equipment, machinery, fencing and breeding stock). Cash flow budgets can be developed with monthly, quarterly and annual time increments. An example of an annual cash flow budget is given in Table 2.

To develop a cash flow budget, start with the enterprise budget. Identify all cash revenues and all cash expenses. For the sale of depreciable assets (buildings, equipment, machinery, cull breeding stock), use the full sale value as a source of cash. For the purchase of depreciable assets, use the purchase price as use of cash. Also, included on the cash flow budget are planned borrowings and principal and interest payments on debt.

Even if an enterprise appears to be profitable, it might not generate a positive cash flow. This is often due to principal payments. Principal payments are the part of a loan payment that reduces the loan balance, where interest payments are “rented” on borrowed money. Principal payments are NOT a business expense but are a use of cash. (Interest payments are both a business expense and a use of cash.) It is also possible that an enterprise will have positive cash flow but not be profitable due to non-cash items, such as depreciation.

More information

Cash flow planning

To see this packet, visit the link below or scan the QR code:

AGEC 751
extension.okstate.edu/fact-sheets/developing-a-cash-flow-plan.html

agecon.okstate.edu/extension/



Table 2

Annual cash flow budget form

| SOURCES OF CASH | |
|---------------------------------------------------|------------|
| Beginning cash balance | |
| Crop sales | |
| Livestock sales | |
| Custom work | |
| Sale of depreciable assets | |
| Sale of land | |
| Proceeds from planned borrowing - cow note | |
| Proceeds from planned borrowing - operating note | |
| Other sources of cash (e.g., contributed capital) | |
| Total sources of cash | (A) |

| USES OF CASH | |
|--------------------------------------|--------------|
| Cash expenses | |
| Breeding stock purchases | |
| Purchase of other depreciable assets | |
| Purchase of land | |
| Principal payments | |
| Interest payments on long-term debt | |
| Operating note repayment | |
| Interest on operating note | |
| Other uses of cash | |
| Total uses of cash | (B) |
| | |
| Net cash surplus or deficit | (A-B) |

Name: _____ Date: _____

Again, return to Megan's example above. Megan will borrow \$250 on a youth loan to purchase a bred cow. She will repay this note over three years at a 5% interest rate. Principal payments will be \$79 in the first year. Interest in the first year will be \$12.50. Megan will also take out an operating note at 5% to pay for feed and veterinary expenses during the year. The operating note is repaid after the calf is sold in December. To estimate interest on the operating note, use the formula on page 10.

There is an additional source of cash in Megan's example. She will allocate \$500 of her savings (beginning cash balance) to purchase the bred cow. Utilizing this information and the information provided in the Introduction and Exercise 1, complete the cash flow budget in Table 2.

If Megan's project were to have a negative projected cash flow, suggest ways to improve her cash flow.

| SOURCES OF CASH | |
|---------------------------------------------------|------------------------|
| Beginning cash balance | \$ 500 |
| Crop sales | |
| Livestock sales | \$ 693 |
| Custom work | |
| Sale of depreciable assets | |
| Sale of land | |
| Proceeds from planned borrowing - cow note | \$ 250 |
| Proceeds from planned borrowing - operating note | \$ 309.60 |
| Other sources of cash (e.g., contributed capital) | |
| Total sources of cash | \$ 1,752.60 (A) |

| USES OF CASH | |
|--------------------------------------|------------------------|
| Cash expenses | \$ 309.60 |
| Breeding stock purchases | \$ 750 |
| Purchase of other depreciable assets | |
| Purchase of land | |
| Principal payments | \$ 79 |
| Interest payments on long-term debt | \$ 12.50 |
| Operating note repayment | \$ 309.60 |
| Interest on operating note | \$ 7.74 |
| Other uses of cash | |
| Total uses of cash | \$ 1,468.44 (B) |
| | |
| Net cash surplus or deficit | \$ 284.16 (A-B) |

First, enter sources of cash. Enter the cash revenue from the sale of the calf. Enter the proceeds from the loan to purchase the bred cow and the proceeds from the operating note. The only other source of cash is Megan's beginning cash balance of \$500.

Next, enter uses of cash. Enter the cash expenses (feed and veterinary). The full purchase price of the bred cow is entered. The principal payment and interest on the cow note are entered. The operating note will be repaid when the calf is sold.

Then, estimate the interest on the operating note as:

$$\$309.60 / 2 \times 0.05 = \$7.74.$$

While Megan's project appears to have positive cash flow for the first year, if she needed to improve cash flow, she might be able to reduce the heifer's feed costs. She might be able to "roll" part of her operating note balance forward into the next year if she anticipates more cash flow in the coming year. Since she should sell two calves in the coming year, this is a possibility. However, this is not recommended as a standard practice. Carryover of an operating loan is often the first sign of growing financial stress in a commercial operation. If circumstances are not expected to improve dramatically in the following year, operators might find themselves accumulating debt loads from which they can't recover.

BALANCE SHEETS

Balance sheets are used to measure the financial position or “health” of an individual or business. A balance sheet is a listing of everything that an individual (or business) owns, everything it owes and net worth. The items that are owned are called assets. The amounts that are owed to someone else are called liabilities. Assets – liabilities = net worth (or owner’s equity). This financial statement is said to balance because assets are listed on the left-hand side, and liabilities and net worth are listed on the right-hand side. If we sum the right-hand side (i.e., liabilities + net worth), it is equal to the left-hand side (assets), and therefore, balances. A general format for a balance sheet is presented in Table 3.

Table 3. General format of a balance sheet

| CURRENT ASSETS | | CURRENT LIABILITIES | |
|------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Cash, near-cash, supplies, accounts receivable, crops held for sale, livestock held for sale, cash invested in growing crops | \$ A | Accounts payable, accrued taxes (property), operating note balance, accrued interest, current portion of long-term debt | \$ D |
| NON-CURRENT ASSETS | | NON-CURRENT LIABILITIES | |
| Machinery, equipment, breeding livestock, fencing, land | \$ B | Non-current portion of machinery and equipment notes, non-current portion of breeding stock notes, non-current portion of mortgages | \$ E |
| Total assets | \$ C (A+B) | Total Liabilities | \$ F (= D+E) |
| | | Owner’s equity | \$ G (= C-F) |
| | | Total liabilities + owner’s equity | \$ H (= F+G) |

Current assets include all cash and near-cash assets, such as savings accounts, checking accounts, certificates of deposit, bonds and stocks. Current assets also include all supply inventories, feed, fuel, fertilizer, chemicals, etc. Also, crop inventories and feeder livestock are included as current assets. Generally, current assets are assets that will be used or sold within a year. Finally, cash invested in growing crops (such as applied fertilizer, seed and chemicals) is considered a current asset.

Non-current assets are durable or long-lived assets. All assets that are expected to be used in the business for more than one year are non-current assets. So, farm and ranch machinery and equipment, breeding livestock, buildings, fencing and land are all non-current assets.

Assets can be valued two ways, “market basis” and “cost basis.” Using “market basis,” the value is equal to their fair market value less disposal costs (advertising, commission, etc.). On cost-basis balance sheets, non-current assets are

Balance sheets

valued at their purchase price minus accumulated depreciation, except for land, which is not depreciated. Since land does not depreciate it is valued at its purchase price on a cost-basis balance sheet. Under both types of balance sheets, market values are used for current assets. For tracking the performance of the farm over time, cost-basis balance sheets are more useful. However, your loan officer will probably want you to provide a market-basis balance sheet.

Current liabilities are obligations which are due within one year. Accounts payable (such as charge accounts at the feed store or chemical dealer) are current liabilities. Accrued property taxes (taxes due) are also a current liability. Property taxes are typically paid in the year following the date that they are assessed. So, calendar year 2010 taxes are often due at the end of 2010 or early 2011. Since property taxes are due within a year, they are current liabilities. Operating notes are typically paid off or renewed annually, making them current liabilities. Accrued interest (interest due) on loans is usually paid within a calendar year, so it is a current liability. Finally, principal payments on long-term loans are made during the calendar year. The principal payments due within a calendar year are current liabilities.

Non-current liabilities are obligations that are due beyond at least one year. Machinery and equipment note balances, breeding stock loan balances and mortgage balances are non-current liabilities. It is important to remember that part of the loan principal is current—that is, some of the note is due in the coming year and must be treated as a current liability. The principal payment paid in the coming year is subtracted from the loan balance to find the non-current portion of long-term debts.

Owner's equity or net worth is computed as total assets minus total liabilities. Owner's equity represents the amount of the owner's capital invested in the business. Owner's equity has three sources: contributed capital, retained earnings and market value changes (only on a market-basis balance sheet). Contributed capital is the amount (or value) of cash and assets that the owner has put into the business. While these contributions usually occur at the business start up, infusions of capital can occur at any point in the business' life. Retained earnings are profits that have not been withdrawn by the owner(s). The profits have been re-invested in the business for the purpose of generating future profits. Finally, on market-basis balance sheets, the value of long-term assets usually varies over time. For example, land usually increases in market value over time (but it also has declined as in the 1980s agricultural land market). A statement of owner's equity can be prepared to report these three sources of owner's equity.

More information

Balance sheets

To see this packet, visit the link below or scan the QR code:

AGEC 752
extension.okstate.edu/fact-sheets/developing-a-balance-sheet.html



Name: _____ Date: _____

Megan will need to provide her lender with a market-basis balance sheet. Currently, she owns a heifer with a value of \$1,000 at the start of the year, a blower valued at \$300, and has \$500 cash. She has no debt. Prepare a balance sheet for the beginning of the year.

Next, prepare an end of year (Dec. 31) market-basis balance sheet for Megan given that she will purchase a bred cow for \$750. She will need to borrow \$250 to complete the purchase. At the end of the year, the cow is expected to be worth \$800. The principal payment on the note will be \$83 next year with interest of \$9. In December, she expects to make a payment of \$79 on the cow note. Her show heifer's value will be \$1,200 at the end of the year. She will need to take out an operating loan equal to her production expenses for the year. This note will be paid off in December. Her blower will be worth \$250 at the end of the year.

Describe the sources of change in Megan's net worth.

Megan has no liabilities, so the beginning-of-year balance sheet (Table 4) has only her three assets (as of Jan. 1): cash, blower and heifer.

Table 4. Beginning-of-year balance sheet

| CURRENT ASSETS | | CURRENT LIABILITIES | |
|---------------------------------|-----------------|-------------------------------------------|-----------------|
| Cash | \$ 500 | — | |
| Total current assets | \$ 500 | Total Current Liabilities | \$ 0 |
| | | | |
| NON-CURRENT ASSETS | | NON-CURRENT LIABILITIES | |
| Blower | \$ 300 | — | |
| Show heifer | \$ 1,320 | Total non-current liabilities | \$ 0 |
| Total non-current assets | \$ 1,820 | Total liabilities | \$ 1,820 |
| | | | |
| Total assets | \$ 1,820 | Owner's equity | \$ 1,820 |
| | | Total liabilities + owner's equity | \$ 1,820 |

The end-of-year balance sheet is given in Table 5. At the end of the year, Megan will have added a cow (valued at \$800 at the end of the year) to her assets and her show heifer's value will increase to \$1,200. While she will spend her \$500 of cash on the purchase of a cow, her sale of a calf partially rebuilt her cash balance. From the cash flow budget, a cash balance of \$284 is projected. Her blower will decrease in value to \$250 by the end of the year. In net, her assets increased to \$2,537.

Her liabilities will also increase. A payment of \$79 on the cow note was made in December, so the total principal owed on the note is \$171. Since she will make another principal payment of \$83 in the next year, that portion of the cow note is a current liability. Since the accrued interest (or interest due) on the cow note was paid off at the end of the year, the current liability associated with the cow note is \$0. The remainder of the cow note is due in more than 12 months, so it is a non-current liability. In aggregate, her liabilities increased to \$171. NOTE: Megan will pay off the operating debt in December, so the end of year balance is \$0.

To compute her equity, compute assets – liabilities or \$2,534 - \$171 = \$2,363. So, Megan's net worth increased by \$543 during the year.

Table 5. End-of-year balance sheet

| CURRENT ASSETS | | CURRENT LIABILITIES | |
|---------------------------------|------------------|-------------------------------------------|-----------------|
| Cash | \$ 284 | Operating note | \$ 0 |
| | | Cow note payment | \$ 83 |
| | | Interest on cow note | \$ 0 |
| Total current assets | \$ 284 | Total Current Liabilities | \$ 83 |
| | | | |
| NON-CURRENT ASSETS | | NON-CURRENT LIABILITIES | |
| Blower | \$ 250 | — | |
| Show heifer | \$ 1,200 | Cow note | \$ 88 |
| Cow | \$ 800 | Total non-current liabilities | \$ 88 |
| Total non-current assets | \$ 2,250 | Total liabilities | \$ 171 |
| | | | |
| Total assets | \$ 2, 534 | Owner's equity | \$ 2,363 |
| | | Total liabilities + owner's equity | \$ 2,534 |

Megan's change in net worth is due to the increased value of the heifer and cow, the decrease in blower value and the positive net return from her cow-calf enterprise.

ANALYZING THE BALANCE SHEET

There are two measurements of financial “health” that can be computed from the balance sheet. Solvency measures the ability of an individual or business to pay off all of his/her/its financial obligations. Liquidity measures the ability of a business to meet all of its short-term financial obligations without disrupting future business operations.

Solvency measures include debt-to-asset ratio (D/A), equity-to-asset ratio (E/A) and debt-to-equity ratio (D/E). Debt and liability are interchangeable terms in this context. Each of these ratios is computed directly from the balance sheet. A D/E ratio greater than 1 indicates that creditors have more money invested in the business than the owner(s). Conversely, a ratio less than 1 indicates that the owner(s) has more invested in the business than creditors. It is not uncommon during the startup years of a business that this ratio is greater than 1. The D/E ratio, also called leverage ratio, compares the portion of creditor financing versus equity financing. Large values indicate a highly-leveraged position. This ratio is also used to indicate credit worthiness. Lenders want to see smaller values for D/E.

The D/A ratio reports the portion of assets “owed” to creditors. As a business owner moves closer to retirement, it is usually recommended that he/she work to reduce this ratio.

The E/A asset ratio reports the portion of assets financed by owner equity. A ratio greater than 1 indicates that the owner(s) has more invested in the business than creditors.

Mathematically, it is easy to show that:

$$D/A + E/A = 1$$

$$\text{Rewriting, } (D + E)/A = 1$$

Recalling that debt = liabilities ($D = L$)

$$A = L + E, \text{ replace the numerator with } A$$

$$\text{So, } A/A = 1$$

This relationship is often used in agricultural economics competitions to test contestants’ knowledge of financial ratios. Problems at the end of this section provide examples.

The D/E ratio, also called leverage ratio, compares the portion of creditor financing versus equity financing. Large values indicate a highly leveraged position. This ratio is also used to indicate credit worthiness. Lenders want to see smaller values for D/E.

Liquidity is measured using two measures, working capital and current ratio. Working capital is computed as current assets – current liabilities. In other words, if all current assets were liquidated, could all current debts be paid off? So, positive values are preferred. Because businesses of different sizes will have different liquidity needs, this measure lacks a relative scale. For example, is working capital of \$1,000 sufficient? In Megan’s example above, \$1,000 of working capital is more than sufficient. However, for a large, multinational company, it is woefully inadequate. (Think about BP and its working capital requirements, especially after the May 2010 oil leak.)

The current ratio is computed as current assets divided by current liabilities. A value greater than two is preferred as it indicates an ability to cover all current obligations without sacrificing long-term assets. Businesses with frequent sales often have a high current ratio.

Name: _____ Date: _____

Using the end-of-year balance sheet created in Exercise 3, compute D/A, E/A, D/E, working capital and current ratio.

Will Megan's project be liquid at the end of the year? Will she be solvent?

Exercise 4

Solution

$$D/A = 171 / 2,534 = 0.07$$

$$E/A = 2,363 / 2,534 = 0.93$$

$$D/E = 171 / 2,363 = 0.07$$

$$\text{Working capital} = \$284 - \$83 = \$201$$

$$\text{Current ratio} = 284 / 83 = 3.42$$

Megan's business is projected to be both solvent and liquid.

SUPPLEMENTAL PROBLEMS

Enterprise budgets and analysis

Name: _____ Date: _____

1. The cost of producing winter wheat is \$120 per acre and wheat yields 35 bushels per acre.

- a. Find the breakeven selling price (\$/bushel) for wheat.

- b. If wheat price is \$3.80 per bushel, find the breakeven yield (bushels/acre).

2. The cost of producing a fat hog is \$125.

- a. If a hog sells at 260 pounds, what is the breakeven sale price?

- b. If the market price is 58 cents per pound, what is the breakeven sale weight?

Cash flow budgeting

Name: _____ Date: _____

Use the information below to develop a cash flow budget for a corn enterprise.

Expected corn yield = 100 bushels per acre.

Expected corn price = \$3.40 per bushel.

| PRODUCTION COSTS | \$ PER ACRE |
|------------------|-------------|
| Seed | \$ 62 |
| Fertilizer | \$ 33 |
| Pesticides | \$ 23 |
| Crop insurance | \$ 8 |
| Labor | \$ 10 |
| Fuel, oil, lube | \$ 58 |
| Rent | \$ 30 |
| Repairs | \$ 5 |

| FIXED COSTS | \$ PER ACRE |
|--------------|-------------|
| Depreciation | \$ 24 |
| Interest | \$ 16 |
| Taxes | \$ 24 |

An operating note will be taken out to cover cash expenses. Corn will be planted in April and harvested in November. The interest rate on the operating note will be 7%. Assume a \$0 beginning cash balance.

Balance sheet

Name: _____ Date: _____

Using the information below:

1. Determine if each of the accounts is a current asset (CA), a non-current asset (NCA), a current liability (CL), a non-current liability (NCL) or none of the above (N).
2. Create a balance sheet. (Hint: You will need to compute owner's equity.)
3. In class, several measures of liquidity and solvency were discussed. **List and compute** any two of those measures.

| | |
|---------------------------------|---------|
| Current portion machinery debt | 15,000 |
| Cash | 8,000 |
| Fuel inventory | 2,000 |
| Land | 300,000 |
| Accrued interest (int. payable) | 3,000 |
| Breeding stock | 35,000 |

| | |
|--------------------------------|---------|
| Land debt | 115,000 |
| Machinery | 45,000 |
| Cash invested in growing crops | 5,000 |
| Machinery debt | 45,000 |
| Feeder livestock | 23,000 |
| Current portion mortgage | 20,000 |

Balance sheet

4. Classify each of the following as either a current liability (CL), a non-current liability (NCL), a current asset (CA), a non-current asset (NCA) or NONE. Note: check only ONE category for each. (20 points)

| | CL | NCL | CA | NCA | NONE |
|------------------|----|-----|----|-----|------|
| Cash | | | | | |
| Raised breeding | | | | | |
| Farm mortgage | | | | | |
| Machinery | | | | | |
| Land | | | | | |
| Operating loan | | | | | |
| Taxes payable | | | | | |
| Feeder livestock | | | | | |
| Prepaid expense | | | | | |
| Feed expense | | | | | |
| Accounts payable | | | | | |

5. Given the account information below, generate a balance sheet. Hint: you will need to compute net worth and the market value of land given the information below.

| | | | |
|------------------|---------|----------------------------------|----------|
| Land | ? | Change in cash account | \$ 4,500 |
| Accounts payable | 3,000 | Machinery note | 45,000 |
| Operating loan | 24,000 | Current portion - machinery note | 12,000 |
| Machinery | 80,000 | Current portion - land note | 15,000 |
| Buildings | 35,000 | Cash | 15,000 |
| Supplies | 4,000 | Accrued interest (payable) | 13,500 |
| Prepaid expense | 3,000 | Grain inventory | 63,000 |
| Mortgage | 102,500 | Crop expenses | 45,000 |
| D/A ratio | 0.4 | | |

SUPPLEMENTAL PROBLEMS

Enterprise budgets and analysis

Solution

1. The cost of producing winter wheat is \$120 per acre and wheat yields 35 bushels per acre.

a. Find the breakeven selling price (\$/bushel) for wheat.

Find the cost per bushel = $\$ 120 / 35 \text{ bushel} = \$ 3.43$, which is the breakeven selling price

b. If wheat price is \$3.80 per bushel, find the breakeven yield (bushels/acre).

*BE yield = cost per acre/selling price = $\$ 120 \text{ per acre} / \$ 3.80 \text{ per bushel}$
= 31.6 bushel per acre.*

2. The cost of producing a fat hog is \$125.

a. If a hog sells at 260 pounds, what is the breakeven sale price?

BE \$ = $\$ 125 / 260 \text{ pounds} = \$ 0.48 \text{ per pound}$.

b. If the market price is \$0.58 per pound, what is the breakeven sale weight?

BE weight = $\$ 125 / \$ 0.58 \text{ per pound} = 216 \text{ pounds}$.

The only difficult part of this exercise is finding the expected interest on cash expenses. First, sum up cash expenses that are paid DURING the growing season. In this case, all expenses EXCEPT depreciation are cash. However, interest on fixed assets is probably not paid during the growing season. Also, taxes are not usually paid during the growing season. So, the grower will be paying interest on \$229. This amount is paid out over the growing season, eight months.

Over the 8 months, the grower has an average of \$114.50 ($=\$229/2$) invested—he starts with \$0 on April 1 and ends with \$229 on November 30. He pays interest on the average amount for 8 months or for 8/12 of the year. The 7% interest rate is an annual rate and must be adjusted to an 8-month equivalent.

So, the expected interest paid is:

$$\$114.50 \times 0.07 \times 8/12 = \$5.34.$$

The rest of the cash flow is straightforward.

Cash flow budget for corn enterprise (per acre):

| SOURCES OF CASH | \$ PER ACRE |
|---------------------------------|---------------|
| Corn sales (100 bu x 4 3.40/bu) | \$ 340 |
| Total sources of cash | \$ 340 |

| USES OF CASH | \$ PER ACRE |
|-------------------------------|------------------|
| Seed | \$ 62 |
| Fertilizer | \$ 33 |
| Pesticides | \$ 23 |
| Crop insurance | \$ 8 |
| Labor | \$ 10 |
| Fuel, oil, lube | \$ 58 |
| Rent | \$ 30 |
| Interest on fixed assets | \$ 16 |
| Taxes on fixed assets | \$ 4 |
| Repairs | \$ 5 |
| Interest on operating | \$ 5.34 |
| Total uses of cash | \$ 254.34 |
| Expected net cash flow | \$ 85.76 |

- Determine if each of the accounts is a current asset (CA), a non-current asset (NCA), a current liability (CL), a non-current liability (NCL) or none of the above (N).

| | CL | NCL | CA | NCA | NONE |
|--------------------------------|----|-----|----|-----|------|
| Current portion machinery debt | CL | | | | |
| Mortgage | | NCL | | | |
| Cash | | | CA | | |
| Machinery | | | | NCA | |
| Fuel inventory | | | CA | | |
| Cash invested in growing crops | | | CA | | |
| Land | | | | NCA | |
| Machinery debt | | NCL | | | |
| Accrued interest | CL | | | | |
| Feeder livestock | | | CA | | |
| Breeding stock | | | | NCA | |
| Current portion mortgage | CL | | | | |

- Create a balance sheet. (Hint: You will need to compute owner's equity.)

| CURRENT ASSETS | | CURRENT LIABILITIES | |
|-----------------------------|---------------|----------------------------------|---------------|
| Cash | 8,000 | Accrued interest | 3,000 |
| Fuel | 2,000 | Current portion | |
| Cash invested | 5,000 | Machinery debt | 15,000 |
| Feeder livestock | 23,000 | Mortgage | 20,000 |
| Total current assets | 38,000 | Total Current Liabilities | 38,000 |

| NON-CURRENT ASSETS | | NON-CURRENT LIABILITIES | |
|---------------------------------|----------------|-------------------------------------------|----------------|
| Machinery | 45,000 | Machinery debt | 30,000 |
| Breeding livestock | 35,000 | Mortgage | 95,000 |
| Land | 300,000 | Total non-current liabilities | 125,000 |
| Total non-current assets | 418,000 | Total liabilities | 163,000 |
| | | | |
| Total assets | 418,000 | Owner's equity | 255,000 |
| | | Total liabilities + owner's equity | 418,000 |

Create balance sheet

Note, to find the non-current portion of the machinery debt and mortgage, subtract the current portion from the principal balance. So, for example, \$15,000 is the current portion of the machinery debt (out of a total of \$45,000 owed). Then, the difference (\$30,000) is non-current.

To find owner's equity, subtract total liabilities from total assets
 (\$418,000 - \$163,000).

3. In class, several measures of liquidity and solvency were discussed. **List and compute** any two of those measures.

Liquidity measures:

$$\text{Working capital} = \text{current assets} - \text{current liabilities} = \$38,000 - \$38,000 = 0$$

$$\text{Current ratio} = \text{current assets} / \text{current liabilities} = 1$$

Solvency measures:

$$D/A = 163,000/418,000 = 0.39$$

$$E/A = 255,000/418,000 = 0.61$$

$$D/E = 163,000/255,000 = 0.64$$

4. Classify each of the following as either a current liability (CL), a non-current liability (NCL), a current asset (CA), a non-current asset (NCA) or NONE. Note: check only ONE category for each (20 points).

| | CL | NCL | CA | NCA | NONE |
|---------------------------|----|-----|----|-----|------|
| Cash | | | CA | | |
| Raised breeding livestock | | | | NCA | |
| Farm mortgage | | NCL | | | |
| Machinery | | | | NCA | |
| Land | | | | NCA | |
| Operating loan | CL | | | | |
| Taxes payable | CL | | | | |
| Feeder livestock | | | CA | | |
| Prepaid expense | | | CA | | |
| Feed expense | | | | | NONE |
| Accounts payable | CL | | | | |

5. Balance Sheet

| CURRENT ASSETS | | CURRENT LIABILITIES | |
|---------------------------------|----------------|-------------------------------------------|----------------|
| Cash | 15,000 | Accrued interest | 3,000 |
| Fuel | 4,000 | Operating note | 24,000 |
| Prepaid expense | 3,000 | Current portion: | |
| Grain inventory | 63,000 | Machinery note | 12,000 |
| | | Mortgage | 15,000 |
| | | Accrued interest | 13,500 |
| Total current assets | 85,000 | Total Current Liabilities | 38,000 |
| NON-CURRENT ASSETS | | NON-CURRENT LIABILITIES | |
| Machinery | 45,000 | Machinery note | 30,000 |
| Breeding livestock | 35,000 | Mortgage | 102,000 |
| Land | 300,000 | | |
| Total non-current assets | 418,000 | Total non-current liabilities | 132,500 |
| Total assets | 418,000 | Total liabilities | 200,000 |
| | | Owner's equity | 300,000 |
| | | Total liabilities + owner's equity | 500,000 |

The value of land must be computed using the available information. Total liabilities (D) can be found. So, using the D/A ratio, total assets can be found.

As follows:

$$D/A = 0.4$$

$$200,000/A = 0.4$$

So, $200,000 = 0.4 A$. Or, $A = 200,000/0.4 = 500,000$ (=Total Assets). The other assets have a combined value of \$200,000. So, land must be valued at \$300,000.

Owner's equity is computed by subtracting total liabilities from total assets.

Or:

$$\$500,000 - \$200,000 = \$300,000.$$

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