Harnessing the Power of Excel:
Example Applications and Exercises Using Microsoft Excel

Budgets, Payment Schedule, and Weaning Weights

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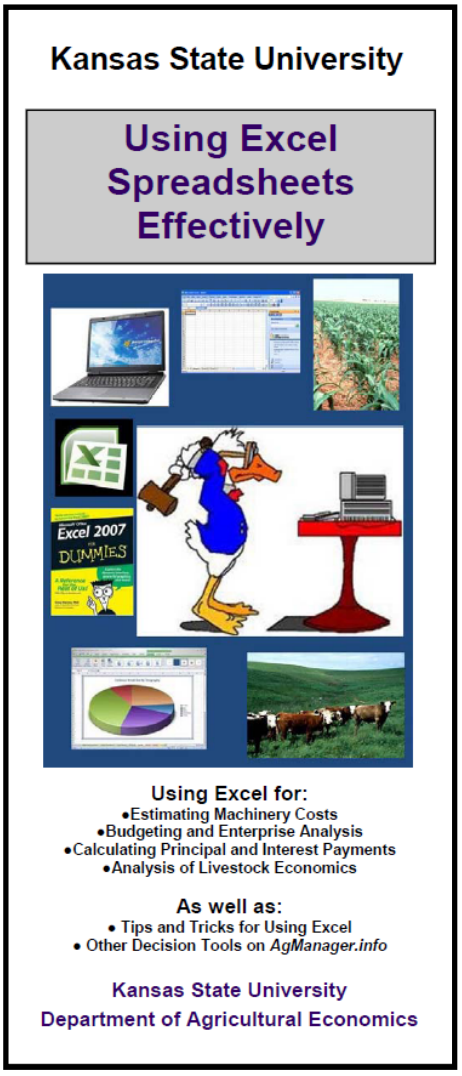


For use at:

Kansas State University Excel Workshops
2016-2017

Exercise 1 – Estimating machinery costs based on custom rates

Situation:

You want to estimate your machinery costs associated for wheat, milo, and soybeans both per acre and total for the farm using the following information:

Field operation	Cost, $/ac
Chisel	$12.59
Disk	$11.97
Field cultivate	$11.11
Plant/drill	
Wheat	$15.86
Milo	$18.25
Soybeans	$18.38
NH3 application	$14.52
Fertilizer application	$6.19
Herbicide application	$6.26
Insecticide/fungicide application	$6.29
Harvest	
Wheat	$38.08
Milo	$50.68
Soybeans	$35.37

Machinery cost category	%
Fuel and oil	21.2%
Repairs	16.3%
Labor	24.8%
Depreciation	21.5%
Interest	12.6%
Insurance & shelter	3.6%

Operations performed by crop are the following:
Wheat – chisel; disk; field cultivate; drill; NH3, herbicide, and fungicide applications; harvest
Milo – plant; NH3, fertilizer, and herbicide (2) applications; harvest
Soybeans – plant; fertilizer and herbicide (3) applications; harvest

Acres planted to each crop: wheat = 800; milo = 400; and soybeans = 400.

What to do:

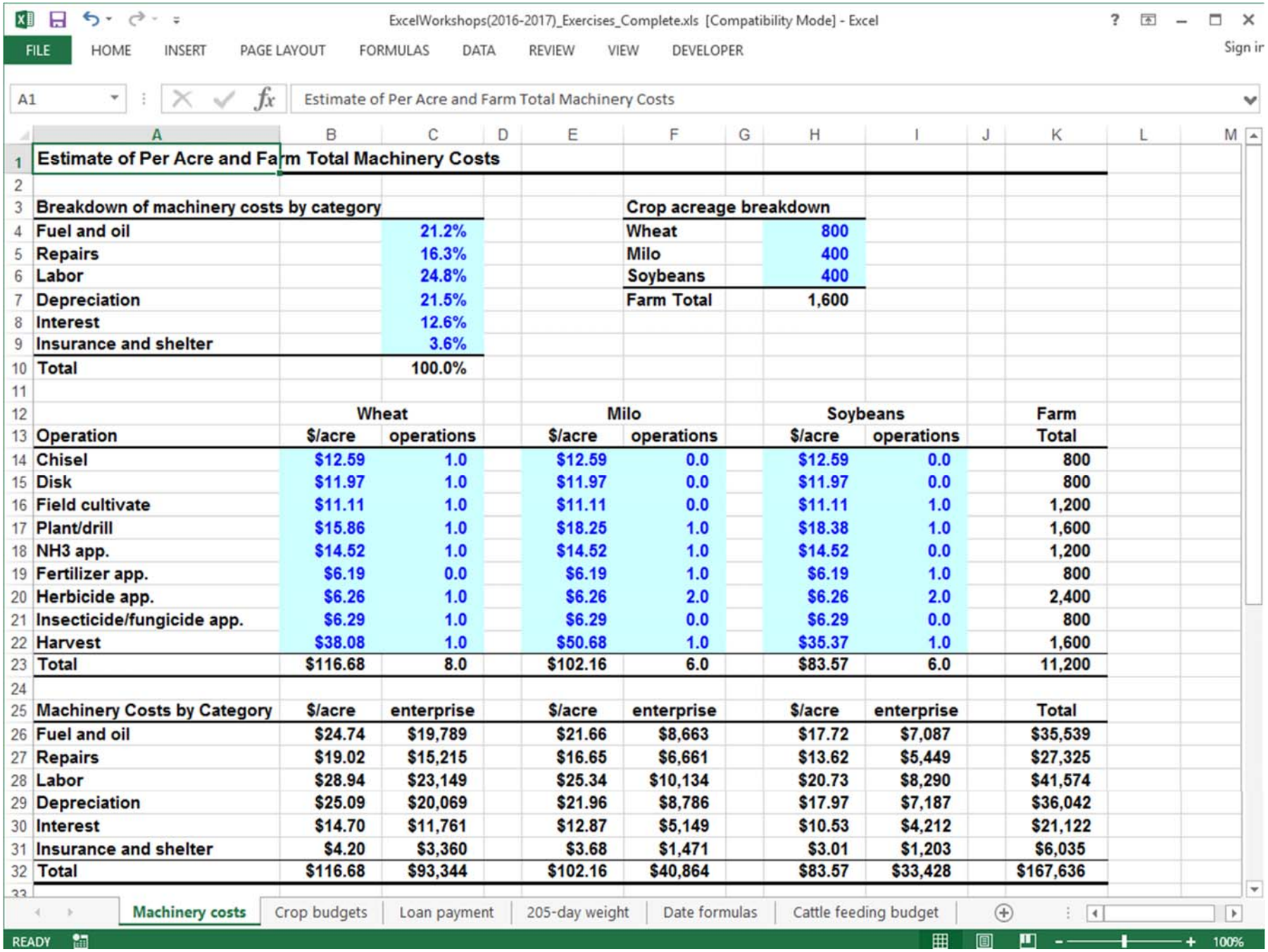
1. Determine the total machinery costs per acre for each crop.

2. Calculate the total acres of each operation for the farm.

3. Estimate the costs per acre for each crop by machinery cost category.

4. Estimate the total costs by category for each crop enterprise and the total for the farm.

5. How would the **total** machinery costs for the farm change if the wheat were planted no-till (cost of drilling increases from $14.93/acre to $17.70/acre) and the three tillage operations were replaced with three herbicide applications (total of four herbicide applications)?



Estimate of Per Acre and Farm Total Machinery Costs												
Breakdown of machinery costs by category					Crop acreage breakdown							
Fuel and oil		21.2%			Wheat	800						
Repairs		16.3%			Milo	400						
Labor		24.8%			Soybeans	400						
Depreciation		21.5%			Farm Total	1,600						
Interest		12.6%										
Insurance and shelter		3.6%										
Total		100.0%										
	Wheat		Milo		Soybeans		Farm					
Operation	$/acre	operations	$/acre	operations	$/acre	operations	Total					
Chisel	$12.59	1.0	$12.59	0.0	$12.59	0.0	800					
Disk	$11.97	1.0	$11.97	0.0	$11.97	0.0	800					
Field cultivate	$11.11	1.0	$11.11	0.0	$11.11	1.0	1,200					
Plant/drill	$15.86	1.0	$18.25	1.0	$18.38	1.0	1,600					
NH3 app.	$14.52	1.0	$14.52	1.0	$14.52	0.0	1,200					
Fertilizer app.	$6.19	0.0	$6.19	1.0	$6.19	1.0	800					
Herbicide app.	$6.26	1.0	$6.26	2.0	$6.26	2.0	2,400					
Insecticide/fungicide app.	$6.29	1.0	$6.29	0.0	$6.29	0.0	800					
Harvest	$38.08	1.0	$50.68	1.0	$35.37	1.0	1,600					
Total	$116.68	8.0	$102.16	6.0	$83.57	6.0	11,200					
Machinery Costs by Category	$/acre	enterprise	$/acre	enterprise	$/acre	enterprise	Total					
Fuel and oil	$24.74	$19,789	$21.66	$8,663	$17.72	$7,087	$35,539					
Repairs	$19.02	$15,215	$16.65	$6,661	$13.62	$5,449	$27,325					
Labor	$28.94	$23,149	$25.34	$10,134	$20.73	$8,290	$41,574					
Depreciation	$25.09	$20,069	$21.96	$8,786	$17.97	$7,187	$36,042					
Interest	$14.70	$11,761	$12.87	$5,149	$10.53	$4,212	$21,122					
Insurance and shelter	$4.20	$3,360	$3.68	$1,471	$3.01	$1,203	$6,035					
Total	$116.68	$93,344	$102.16	$40,864	$83.57	$33,428	$167,636					

Exercise 2 – Constructing crop budgets and calculating breakeven prices and yields on crop share rented land

Situation:

You plant wheat (80 ac), milo (40 ac), and soybeans (40 ac) on 160 acres of rented land with a crop share lease. The following table lists your per acre expected costs, yields, prices, and government payments for the next several years. Your crop share arrangement is 2/3 – 1/3 on wheat (sharing fertilizer and fungicide) and is 60 – 40 on the row crops (sharing fertilizer, herbicide, and insecticide – and seed on soybeans). Crop insurance costs are also shared as each party only insures their share of the crop. The landowner pays 100% of the lime expense. Assume you are the tenant (producer), thus receiving 2/3 of the wheat and 60% of the milo and soybeans.

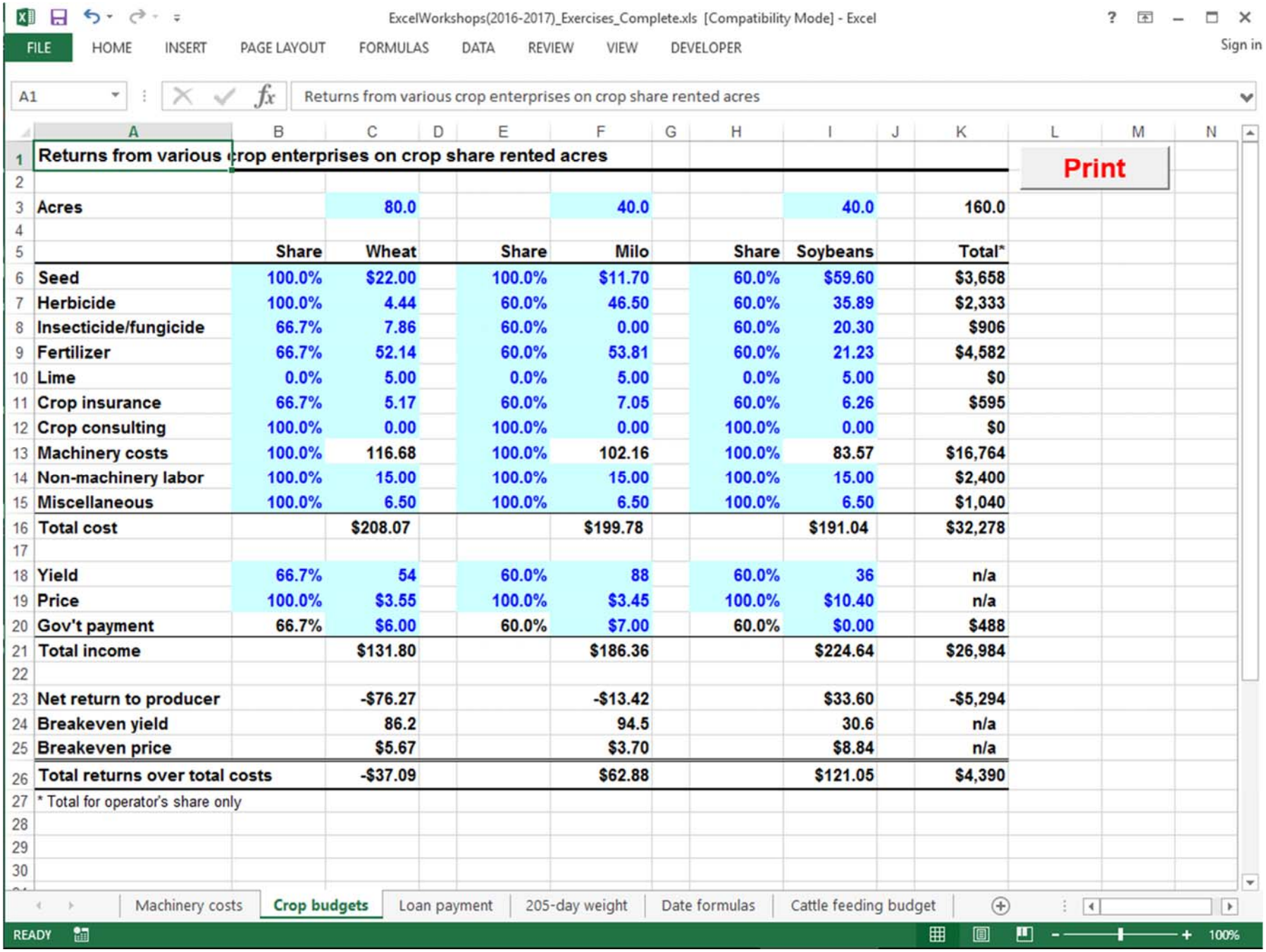
	Wheat	Milo	Soybeans
Seed	$22.00	$11.70	$59.60
Herbicide	4.44	46.50	35.89
Insecticide/fungicide	7.86	0.00	20.30
Fertilizer	52.14	53.81	21.23
Lime	5.00	5.00	5.00
Crop insurance	5.17	7.05	6.26
Crop consulting	0.00	0.00	0.00
Machinery costs	116.68	102.16	83.57
Non-machinery labor	15.00	15.00	15.00
Miscellaneous	6.50	6.50	6.50
Yield	54	88	36
Price	$3.55	$3.45	$10.40
Government payment	$6.00	$7.00	$0.00

What to do:

1. Calculate your total cost per acre and the expected returns per acre on each crop for the coming year as well as the total costs for the 160 acres.

2. Given your costs, prices and government payment, calculate the yield needed at harvest where you would breakeven (i.e., net return = 0). Given the costs, yields, and government payment, calculate your breakeven price.

3. Identify the maximum amount you could pay for cash rent based on the costs, yields, prices, and government payments given (i.e., the returns over costs if you paid 100% of costs and received 100% of income).



Returns from various crop enterprises on crop share rented acres										
Acres		80.0		40.0		40.0	160.0			
	Share	Wheat	Share	Milo	Share	Soybeans	Total*			
Seed	100.0%	$22.00	100.0%	$11.70	60.0%	$59.60	$3,658			
Herbicide	100.0%	4.44	60.0%	46.50	60.0%	35.89	$2,333			
Insecticide/fungicide	66.7%	7.86	60.0%	0.00	60.0%	20.30	$906			
Fertilizer	66.7%	52.14	60.0%	53.81	60.0%	21.23	$4,582			
Lime	0.0%	5.00	0.0%	5.00	0.0%	5.00	$0			
Crop insurance	66.7%	5.17	60.0%	7.05	60.0%	6.26	$595			
Crop consulting	100.0%	0.00	100.0%	0.00	100.0%	0.00	$0			
Machinery costs	100.0%	116.68	100.0%	102.16	100.0%	83.57	$16,764			
Non-machinery labor	100.0%	15.00	100.0%	15.00	100.0%	15.00	$2,400			
Miscellaneous	100.0%	6.50	100.0%	6.50	100.0%	6.50	$1,040			
Total cost		$208.07		$199.78		$191.04	$32,278			
Yield	66.7%	54	60.0%	88	60.0%	36	n/a			
Price	100.0%	$3.55	100.0%	$3.45	100.0%	$10.40	n/a			
Gov't payment	66.7%	$6.00	60.0%	$7.00	60.0%	$0.00	$488			
Total income		$131.80		$186.36		$224.64	$26,984			
Net return to producer		-$76.27		-$13.42		$33.60	-$5,294			
Breakeven yield		86.2		94.5		30.6	n/a			
Breakeven price		$5.67		$3.70		$8.84	n/a			
Total returns over total costs		-$37.09		$62.88		$121.05	$4,390			
* Total for operator's share only										

Exercise 3 – Determining loan payment and sales needed to cover payment

Situation:

Two years ago you borrowed $150,000 at 6.25% for five years. The annual payment on this loan is coming due but you cannot remember the amount of the payment.

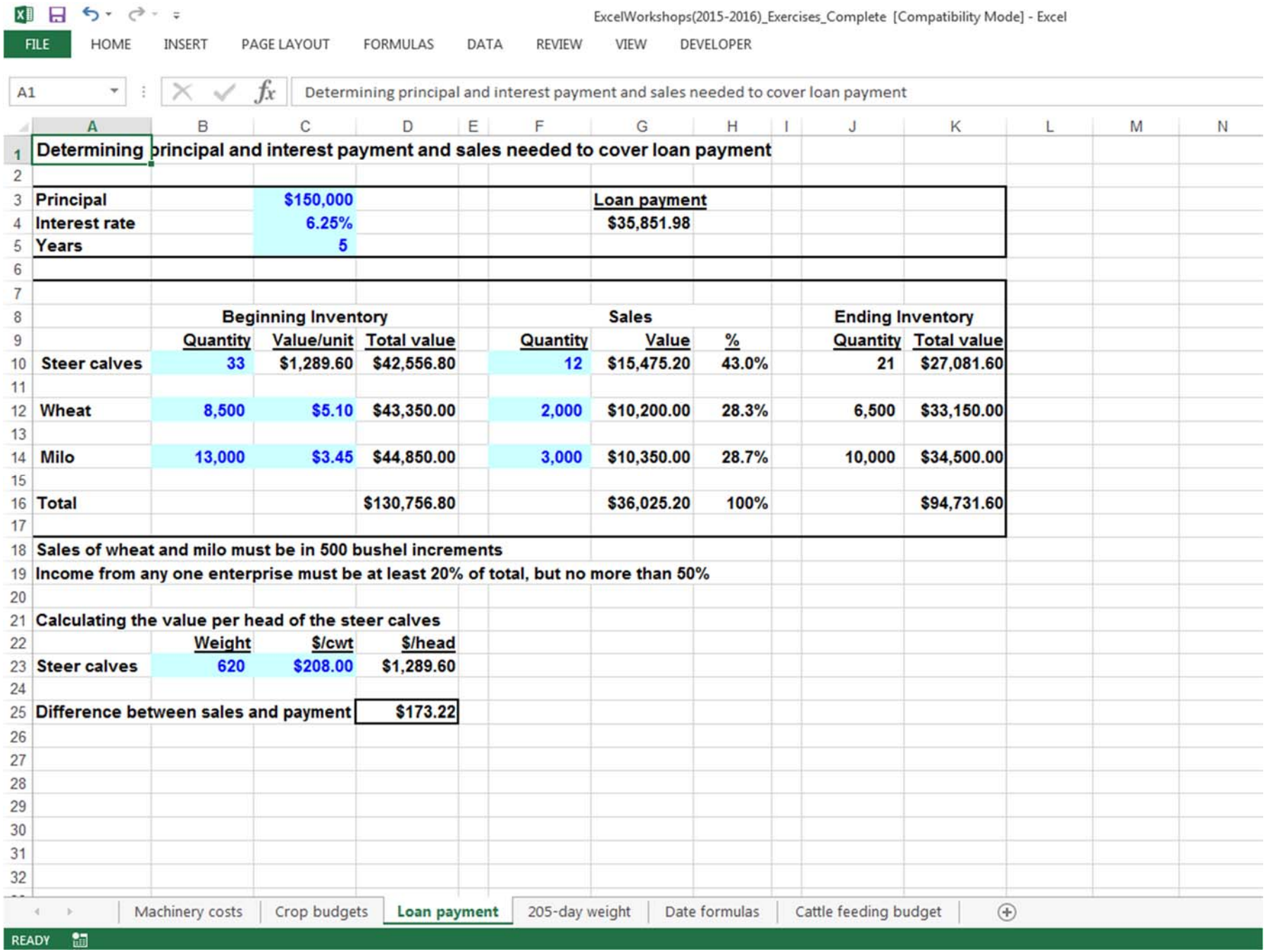
You currently have inventories of steer calves (33 head weighing 620 pounds @ $208/cwt.), wheat (8,500 bushels @ $5.10/bu.), and milo (13,000 bushels @ $3.45/bu). Sales of a combination of these commodities will be sold to cover the loan payment.

What to do:

1. Determine what the annual amortized payment is on your loan.

2. Identify the quantities of calves, wheat, and milo that will need to be sold to cover the entire loan payment. Constraints – at least 20% of the income needed must come from each of the three commodities, but no more than 50% can come from any one commodity and your total sales should not exceed the total loan payment by more than $2,000. Sales of wheat and milo must be in 500 bushel increments (i.e., 500, 1000, 1500, etc.).

3. Identify the value of your inventories prior to making sales as well as after sales are made. Also, identify what percent of total revenue comes from each commodity.



Determining principal and interest payment and sales needed to cover loan payment

Principal	$150,000	Loan payment
Interest rate	6.25%	$35,851.98
Years	5	

	Beginning Inventory			Sales			Ending Inventory	
	Quantity	Value/unit	Total value	Quantity	Value	%	Quantity	Total value
Steer calves	33	$1,289.60	$42,556.80	12	$15,475.20	43.0%	21	$27,081.60
Wheat	8,500	$5.10	$43,350.00	2,000	$10,200.00	28.3%	6,500	$33,150.00
Milo	13,000	$3.45	$44,850.00	3,000	$10,350.00	28.7%	10,000	$34,500.00
Total			$130,756.80		$36,025.20	100%		$94,731.60

Sales of wheat and milo must be in 500 bushel increments

Income from any one enterprise must be at least 20% of total, but no more than 50%

Calculating the value per head of the steer calves

	Weight	$/cwt	$/head
Steer calves	620	$208.00	$1,289.60

Difference between sales and payment $173.22

Exercise 4 – Calculating 205-day adjusted weaning weights for beef calves

Situation:
It is October 15th and you have just weaned and weighed your beef calves. You plan on culling several cows this fall and need to decide which ones. Because all of your cows have great dispositions and are in excellent shape structurally, you need information to assist you in deciding which cows to cull. Your calves are both steers and heifers of varying ages (as are the cows) so you recognize that actual weaning weight is an inappropriate measure. After visiting with your Extension agent you decided you need to calculate 205-day adjusted weaning weights/indexes. You have recording the following information for your calves.

Calf ID	Date of Birth	Birth Weight (BW)	Sex	Age of dam	Weaning Weight (WW)
16-1	2/19/16	93	S	6	610
16-2	3/18/16	78	S	2	575
16-3	3/18/16	81	H	2	540
16-4	3/24/16	85	S	5	585
16-5	3/29/16	68	H	7	510
16-6	4/2/16	74	H	4	505
16-7	4/2/16	83	S	12	520
16-8	4/2/16	69	S	8	490
165-9	4/11/16	76	H	3	505
16-10	4/15/16	73	S	6	495

Your Extension agent has also shared the following information with you:

205 day adjusted weight = (WW – BW) / days of age x 205 + BW + age of dam/sex of calf adj.

Adjustment for age of dam and sex of calf is the following:[1]

Age of dam	Male calves	Female calves
2	+60	+54
3	+40	+36
4	+20	+18
5-10	0	0
11+	+20	+18

What to do:

1. Calculate the age at weaning (days) for each calf, ADG, 205-day weight, and 205-day weight adjusted for age of dam and sex of calf and index (see footnote 1).

2. Calculate the average, minimum, maximum and range for all date, age, and weight variables. Also, calculate the percent of calves that are steers.

3. Construct a graph that compares the actual versus the 205-day adjusted weaning weights for your calves.

[1] Note that the adjustment for sex of calf is not a true sex-adjustment such that 205-day adjusted weaning weights of male and female calves can be compared directly. In order to compare male and female calves, the 205-day adjusted weight of each animal should be divided by the average adjusted 205-day weight for that sex group creating an index value that can then be compared across sexes.

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A1 Calculating 205-day adjusted weaning weight of beef calves

Calculating 205-day adjusted weaning weight of beef calves

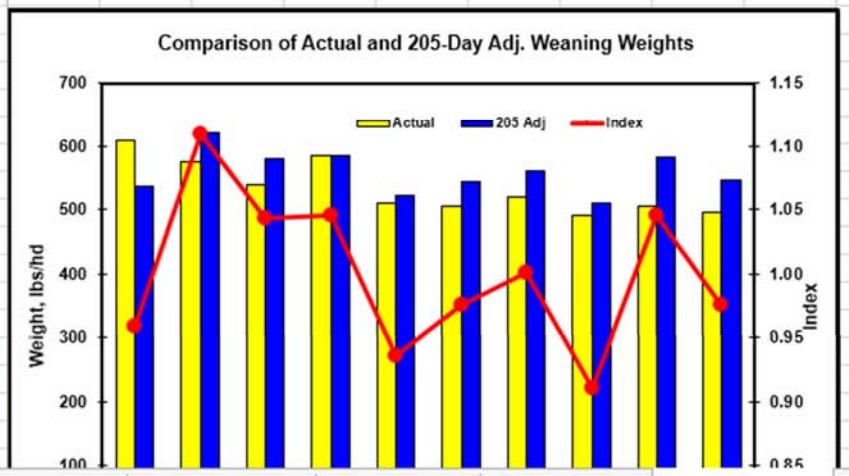
Weaning date 10/15/16

Calf ID	Date of birth	Birth weight	Sex M=1, F=0	Age of dam	Weaning weight	Age at weaning	ADG	205 day wt.	Dam adj.	205-day Adj. WW	205-day Adj. WW Index
16-1	02/19/16	93	1	6	610	239	2.16	536	0	536	0.959
16-2	03/18/16	78	1	2	575	211	2.36	561	60	621	1.110
16-3	03/18/16	81	0	2	540	211	2.18	527	54	581	1.043
16-4	03/24/16	85	1	5	585	205	2.44	585	0	585	1.045
16-5	03/29/16	68	0	7	510	200	2.21	521	0	521	0.936
16-6	04/02/16	74	0	4	505	196	2.20	525	18	543	0.975
16-7	04/02/16	83	1	12	520	196	2.23	540	20	560	1.001
16-8	04/02/16	69	1	8	490	196	2.15	509	0	509	0.910
16-9	04/11/16	76	0	3	505	187	2.29	546	36	582	1.046
16-10	04/15/16	73	1	6	495	183	2.31	546	0	546	0.975
Average	03/26/16	78.0	0.60	5.5	534	202	2.25	540	18.8	558	1.000
Minimum	02/19/16	68.0	0.00	2.0	490	183	2.15	509	0.0	509	0.910
Maximum	04/15/16	93.0	1.00	12.0	610	239	2.44	585	60.0	621	1.110
Range	56	25.0	1.00	10.0	120	56	0.29	76	60.0	112	0.199

Average for male calves 559.6

Average for female calves 556.8

Age of dam	Male	Female
2	60	54
3	40	36
4	20	18
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	20	18
12	20	18
13	20	18
14	20	18
15	20	18



Machinery costs | Crop budgets | Loan payment | 205-day weight | Date formulas | Cattle feeding budget

READY 80%

Exercise 5 – Create a print macro for the spreadsheet from Exercise 2 (Crop budgets)

Situation:

You would like to be able to print the budget easily each time you change values or crops. Create a macro with a button in the upper right corner which allows you to simply click the button to print the spreadsheet.

Some instructions on recording a macro:

A macro is a small program within Excel which functions as a shortcut to do a specific task, such as printing a range of cells.

A macro can be easily recorded using the Macro Recorder. In the Developer tab, click "Record Macro", provide a name for it, assign a short-cut key, then press OK. Do whatever task you are wanting to create a macro for, in order, then click the "Stop Recording" button.

To run the macro, use Ctrl and the short-cut key you selected; or click on Macros in the Developer tab. This brings up a list of macros in the spreadsheet. Click on one and press Run.

The macro can also be associated with a button for ease of use. On the Developer tab, click "Insert", then select a button and locate it where you would like it in the spreadsheet. Record the macro by doing the task you would like to do with the button, then "Stop Recording".