Working with Computer Spreadsheets: Example Applications and Exercises Using Microsoft Excel

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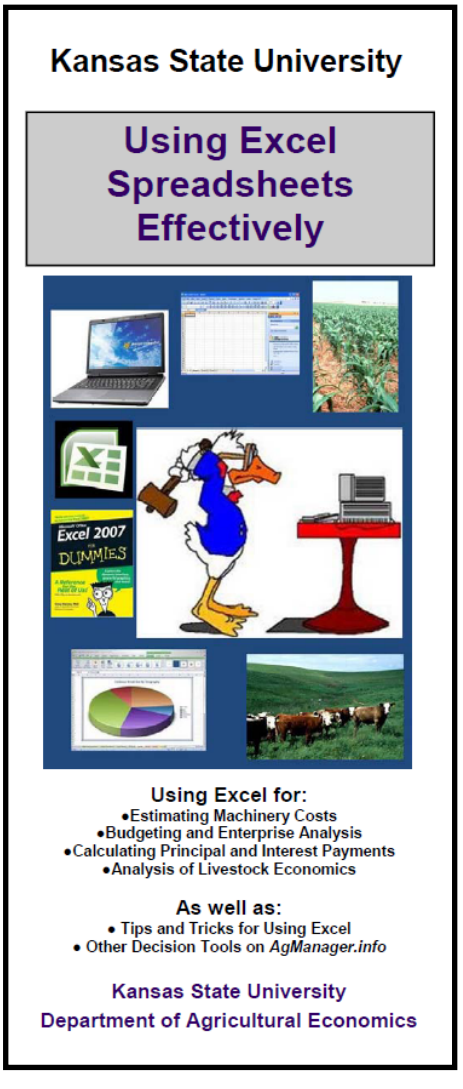


Presented at:

"Using Excel Spreadsheets Effectively"
Kansas State University Excel Workshops
2015-2016

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	$12.99
Disk	$11.60
Field cultivate	$10.93
Plant/drill	
Wheat	$14.93
Milo	$16.59
Soybeans	$16.96
NH3 application	$13.49
Fertilizer application	$5.95
Herbicide application	$6.01
Insecticide/fungicide application	$6.06
Harvest	
Wheat	$39.18
Milo	$53.12
Soybeans	$37.14

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:

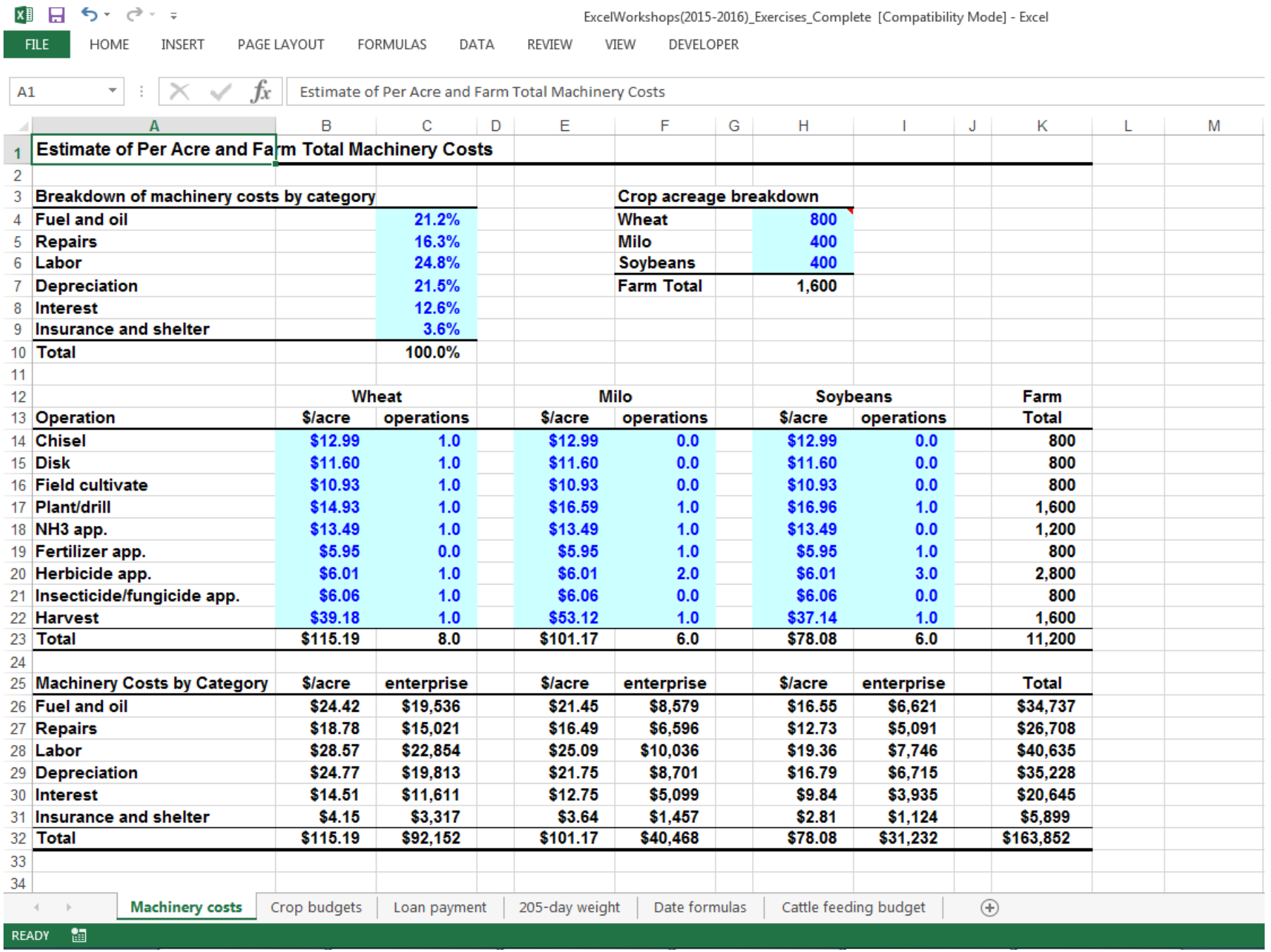
1. Determine the total machinery costs per acre for each crop.

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)?


ExcelWorkshops(2015-2016)_Exercises_Complete [Compatibility Mode] - Excel
FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER
A1
Estimate of Per Acre and Farm Total Machinery Costs
Estimate of Per Acre and Farm Total Machinery Costs
Breakdown of machinery costs by category
Fuel and oil 21.2%
Repairs 16.3%
Labor 24.8%
Depreciation 21.5%
Interest 12.6%
Insurance and shelter 3.6%
Total 100.0%
Crop acreage breakdown
Wheat 800
Milo 400
Soybeans 400
Farm Total 1,600
Wheat Milo Soybeans Farm
Operation $/acre operations $/acre operations $/acre operations Total
Chisel $12.99 1.0 $12.99 0.0 $12.99 0.0 800
Disk $11.60 1.0 $11.60 0.0 $11.60 0.0 800
Field cultivate $10.93 1.0 $10.93 0.0 $10.93 0.0 800
Plant/drill $14.93 1.0 $16.59 1.0 $16.96 1.0 1,600
NH3 app. $13.49 1.0 $13.49 1.0 $13.49 0.0 1,200
Fertilizer app. $5.95 0.0 $5.95 1.0 $5.95 1.0 800
Herbicide app. $6.01 1.0 $6.01 2.0 $6.01 3.0 2,800
Insecticide/fungicide app. $6.06 1.0 $6.06 0.0 $6.06 0.0 800
Harvest $39.18 1.0 $53.12 1.0 $37.14 1.0 1,600
Total $115.19 8.0 $101.17 6.0 $78.08 6.0 11,200
Machinery Costs by Category $/acre enterprise $/acre enterprise $/acre enterprise Total
Fuel and oil $24.42 $19,536 $21.45 $8,579 $16.55 $6,621 $34,737
Repairs $18.78 $15,021 $16.49 $6,596 $12.73 $5,091 $26,708
Labor $28.57 $22,854 $25.09 $10,036 $19.36 $7,746 $40,635
Depreciation $24.77 $19,813 $21.75 $8,701 $16.79 $6,715 $35,228
Interest $14.51 $11,611 $12.75 $5,099 $9.84 $3,935 $20,645
Insurance and shelter $4.15 $3,317 $3.64 $1,457 $2.81 $1,124 $5,899
Total $115.19 $92,152 $101.17 $40,468 $78.08 $31,232 $163,852
Machinery costs
Crop budgets
Loan payment
205-day weight
Date formulas
Cattle feeding budget
READY

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.

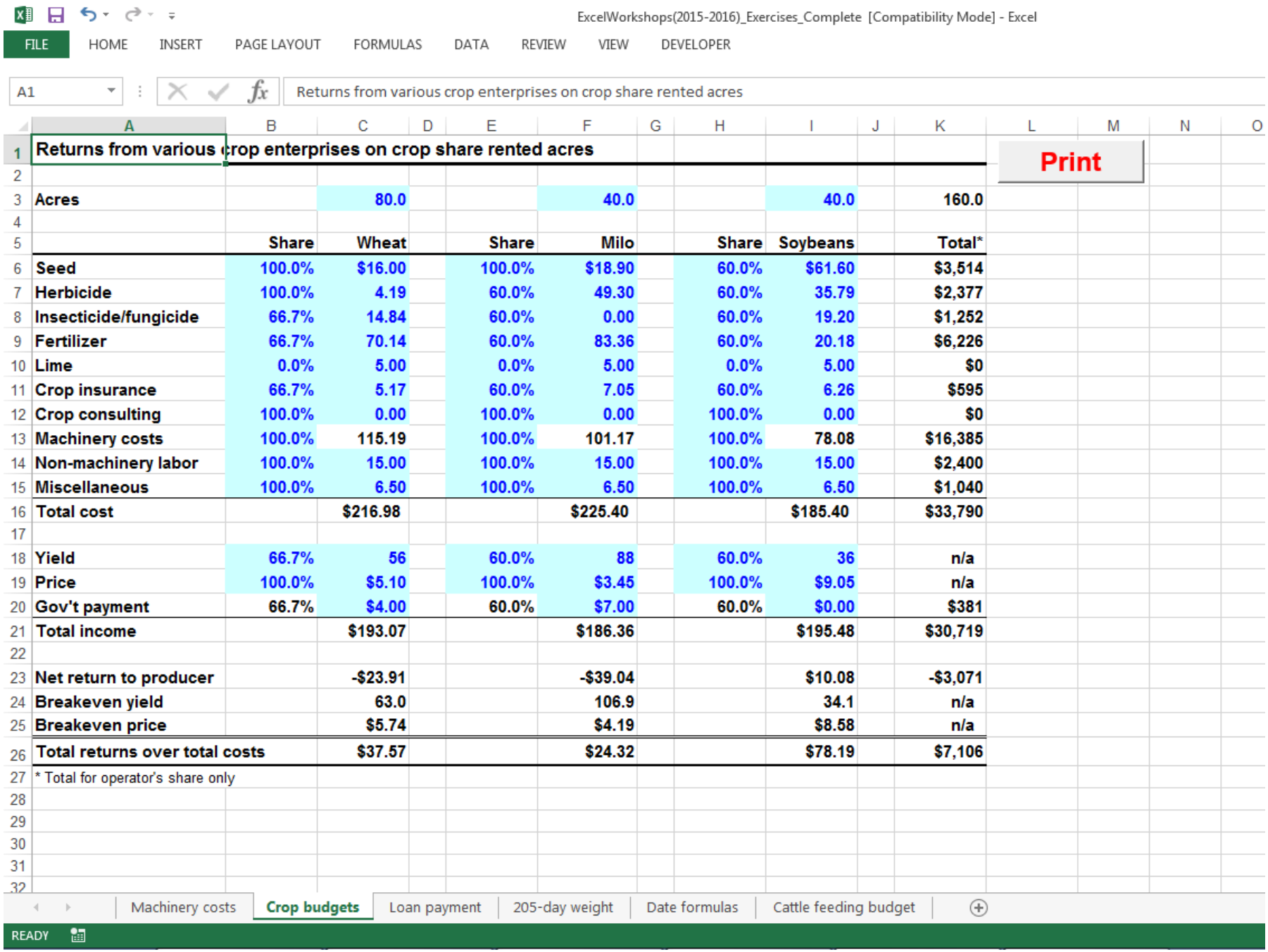
	Wheat	Milo	Soybeans
Seed	$16.00	$18.90	$61.60
Herbicide	4.19	49.30	35.79
Insecticide/fungicide	14.84	0.00	19.20
Fertilizer	70.14	83.36	20.18
Lime	5.00	5.00	5.00
Crop insurance	5.17	7.05	6.26
Crop consulting	0.00	0.00	0.00
Machinery costs	115.19	101.17	78.08
Non-machinery labor	15.00	15.00	15.00
Miscellaneous	6.50	6.50	6.50
Yield	56	88	36
Price	$5.10	$3.45	$9.05
Government payment	$4.00	$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).



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**Returns from various crop enterprises on crop share rented acres**														
2															
3	**Acres**		80.0			40.0			40.0		160.0				
4															
5		**Share**	**Wheat**		**Share**	**Milo**		**Share**	**Soybeans**		**Total***				
6	**Seed**	100.0%	$16.00		100.0%	$18.90		60.0%	$61.60		$3,514				
7	**Herbicide**	100.0%	4.19		60.0%	49.30		60.0%	35.79		$2,377				
8	**Insecticide/fungicide**	66.7%	14.84		60.0%	0.00		60.0%	19.20		$1,252				
9	**Fertilizer**	66.7%	70.14		60.0%	83.36		60.0%	20.18		$6,226				
10	**Lime**	0.0%	5.00		0.0%	5.00		0.0%	5.00		$0				
11	**Crop insurance**	66.7%	5.17		60.0%	7.05		60.0%	6.26		$595				
12	**Crop consulting**	100.0%	0.00		100.0%	0.00		100.0%	0.00		$0				
13	**Machinery costs**	100.0%	115.19		100.0%	101.17		100.0%	78.08		$16,385				
14	**Non-machinery labor**	100.0%	15.00		100.0%	15.00		100.0%	15.00		$2,400				
15	**Miscellaneous**	100.0%	6.50		100.0%	6.50		100.0%	6.50		$1,040				
16	**Total cost**		$216.98			$225.40			$185.40		$33,790				
17															
18	**Yield**	66.7%	56		60.0%	88		60.0%	36		n/a				
19	**Price**	100.0%	$5.10		100.0%	$3.45		100.0%	$9.05		n/a				
20	**Gov't payment**	66.7%	$4.00		60.0%	$7.00		60.0%	$0.00		$381				
21	**Total income**		$193.07			$186.36			$195.48		$30,719				
22															
23	**Net return to producer**		-$23.91			-$39.04			$10.08		-$3,071				
24	**Breakeven yield**		63.0			106.9			34.1		n/a				
25	**Breakeven price**		$5.74			$4.19			$8.58		n/a				
26	**Total returns over total costs**		$37.57			$24.32			$78.19		$7,106				
27	* Total for operator's share only														
28															
29															
30															
31															
32															

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.

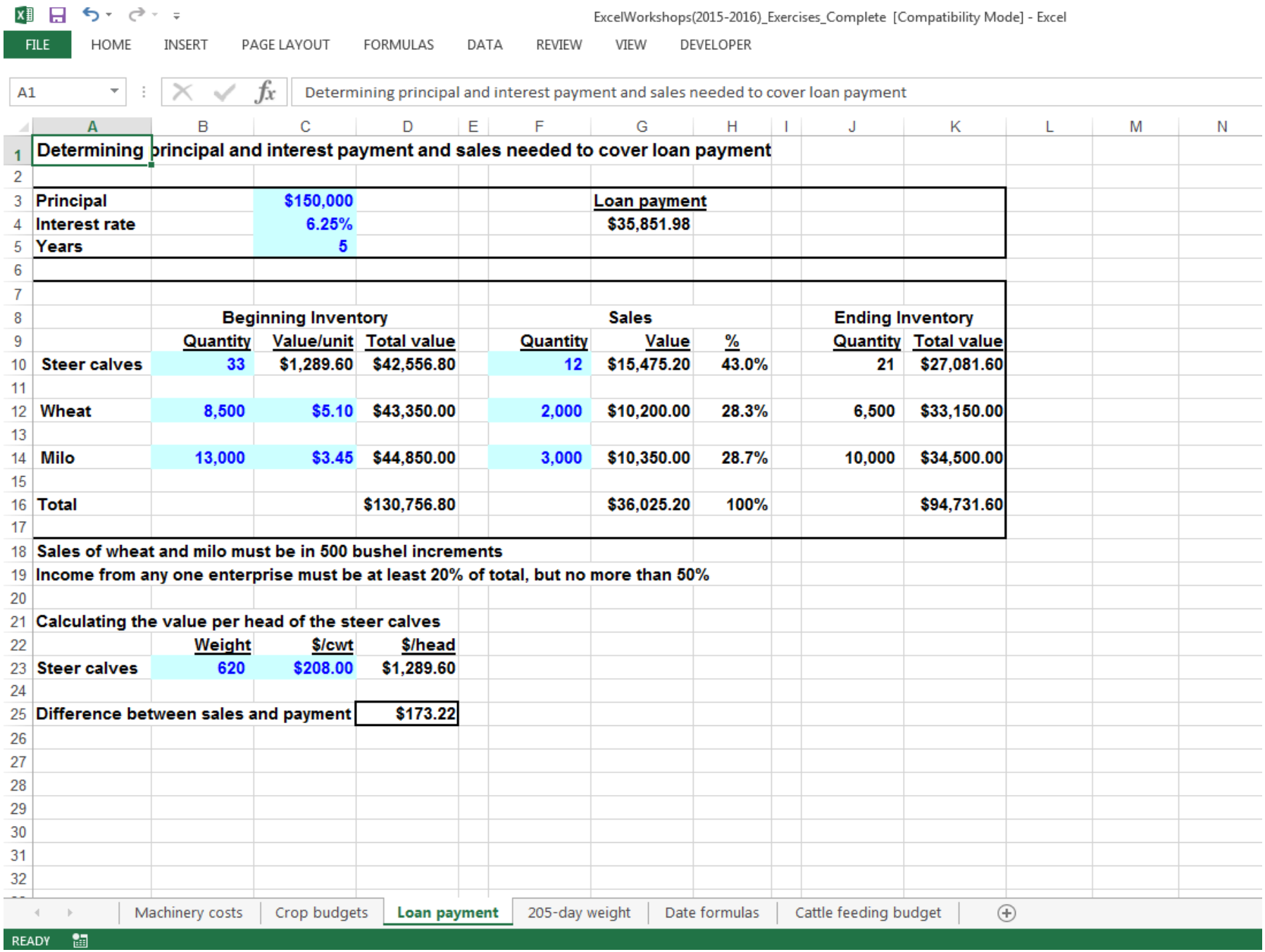
You currently have inventories of steer calves (33 head weighing 620 pounds @ $208/cwt.), wheat (8,500 bushels @ $5.10/bu.), and milo (13,000 bushels @ $3.45/bu). Sales of a combination of these commodities will be sold to cover the loan payment.

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)
10-1	2/19/15	93	S	6	610
10-2	3/18/15	78	S	2	575
10-3	3/18/15	81	H	2	540
10-4	3/24/15	85	S	5	585
10-5	3/29/15	68	H	7	510
10-6	4/2/15	74	H	4	505
10-7	4/2/15	83	S	12	520
10-8	4/2/15	69	S	8	490
10-9	4/11/15	76	H	3	505
10-10	4/15/15	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 10/15/15

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
10-1	02/19/15	93	1	6	610	238	2.17	538	0	538	0.961
10-2	03/18/15	78	1	2	575	211	2.36	561	60	621	1.109
10-3	03/18/15	81	0	2	540	211	2.18	527	54	581	1.043
10-4	03/24/15	85	1	5	585	205	2.44	585	0	585	1.045
10-5	03/29/15	68	0	7	510	200	2.21	521	0	521	0.936
10-6	04/02/15	74	0	4	505	196	2.20	525	18	543	0.975
10-7	04/02/15	83	1	12	520	196	2.23	540	20	560	1.000
10-8	04/02/15	69	1	8	490	196	2.15	509	0	509	0.910
10-9	04/11/15	76	0	3	505	187	2.29	546	36	582	1.046
10-10	04/15/15	73	1	6	495	183	2.31	546	0	546	0.975
Average	03/26/15	78.0	0.60	5.5	534	202	2.25	540	18.8	559	1.000
Minimum	02/19/15	68.0	0.00	2.0	490	183	2.15	509	0.0	509	0.910
Maximum	04/15/15	93.0	1.00	12.0	610	238	2.44	585	60.0	621	1.109
Range	55	25.0	1.00	10.0	120	55	0.29	76	60.0	112	0.199

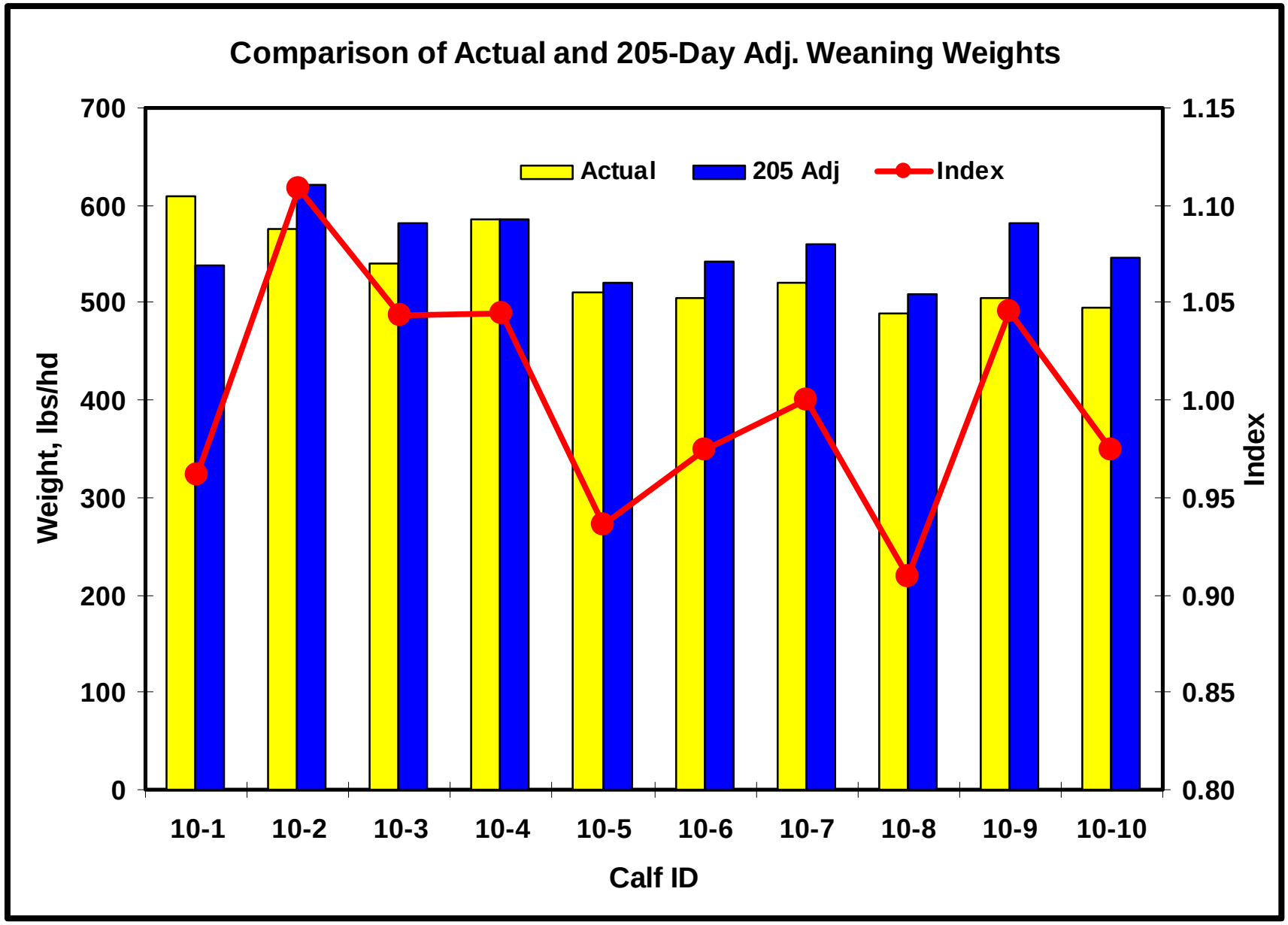
Average for male calves 559.9

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


Comparison of Actual and 205-Day Adj. Weaning Weights
Actual
205 Adj
Index
Weight, lbs/hd
Index
700
600
500
400
300
200
100
0
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
10-1
10-2
10-3
10-4
10-5
10-6
10-7
10-8
10-9
10-10
Calf ID

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.

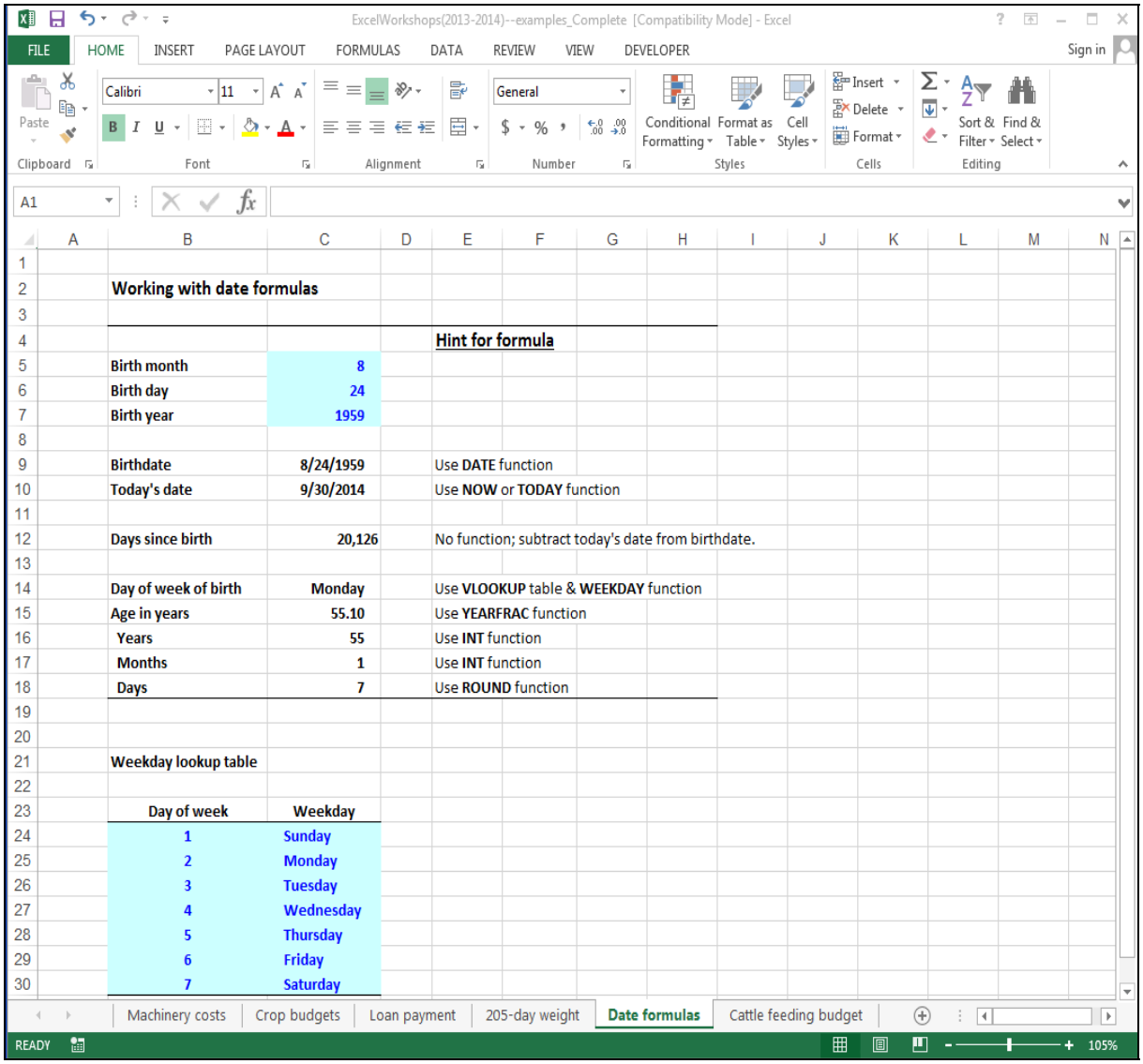
To run the macro, use Ctrl and the short-cut key you selected; or click on Macros in the Developer tab. This brings up a list of macros in the spreadsheet. Click on one and press Run.

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”.

Example 6 – Working With Date Formulas

Description:

Using dates can greatly enhance and make a variety of calculations easier. There are a number of formulas and ways to use dates. Create the following spreadsheet using dates and associated formulas. Hints for appropriate formulas are shown on the right side. As usual, the blue cells are for data entry (numbers) and the black cells are for formulas. Enter your own dates for birth month, day and year.



Example 7 – Cattle Feeding Budget

Description:
You wish to develop a cattle feeding budget and determine net return, cost of gain, and breakeven selling and purchase prices. There are four primary sections to this spreadsheet: Cattle Information, Cost Information, Feed Information, and the Projected Budget.

What to do:
1. Enter cattle information and determine number of head sold, ending weight, gain (including death loss), value of gain per head and per cwt. Be sure to include death loss in these calculations. Hint: include “=Round” function in the calculation for number of head sold.

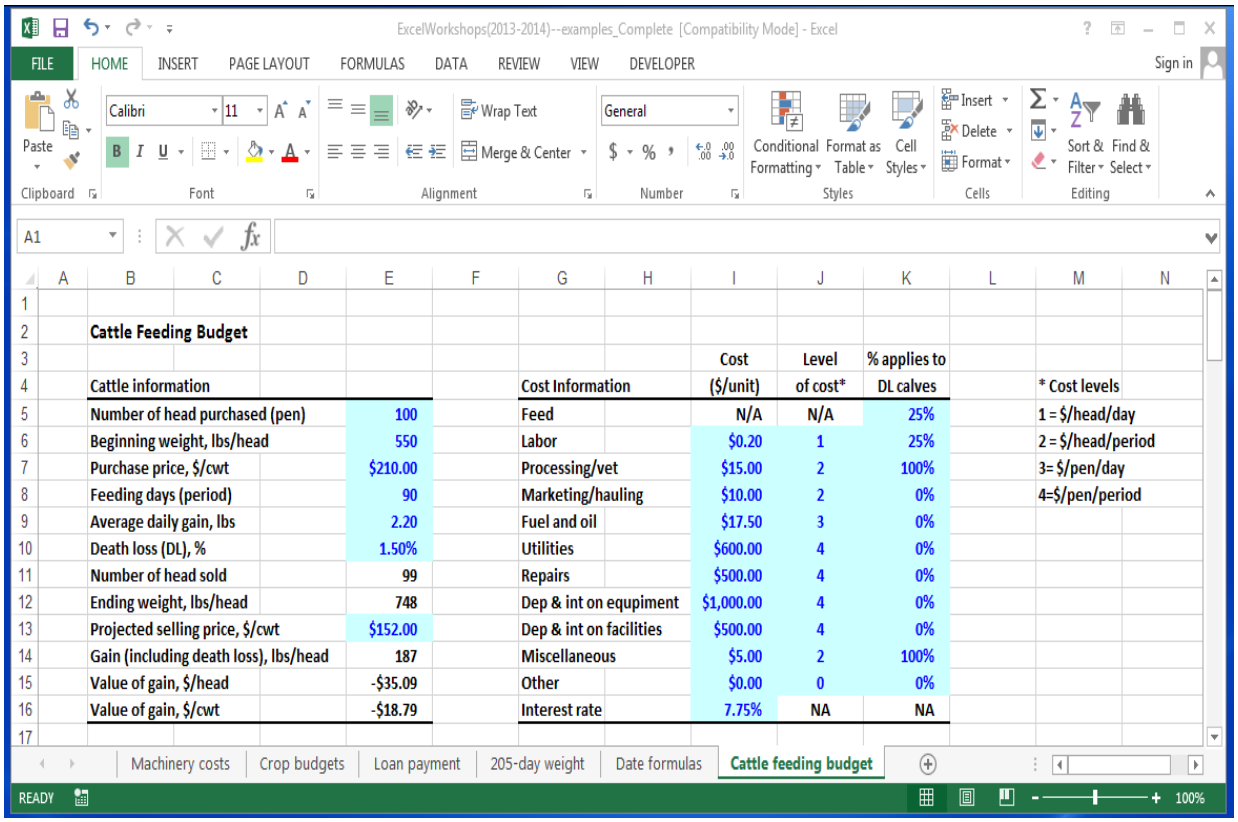
2. Enter cost information as shown. As always, blue cells represent data (numbers) entered from the keyboard.

3. Enter feed information as shown and set up formulas to calculate cost per pound, pounds of feed fed, and total units required.

4. Create the projected budget, per head, and per pen, as shown. All of these cells will include formulas. Do not enter the values directly.

5. Calculate the Net return, Cost of gain, Breakeven selling price, and Breakeven purchase price, as shown at the bottom, using appropriate calculations.

6. How does the cost of gain and breakeven prices change as you increase the price of all feeds by 30% due to the drought?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Calibri
11
Wrap Text
General
Merge & Center
Conditional Formatting
Format as Table
Cell Styles
Insert
Delete
Format
Sort & Filter
Find & Select
Clipboard
Font
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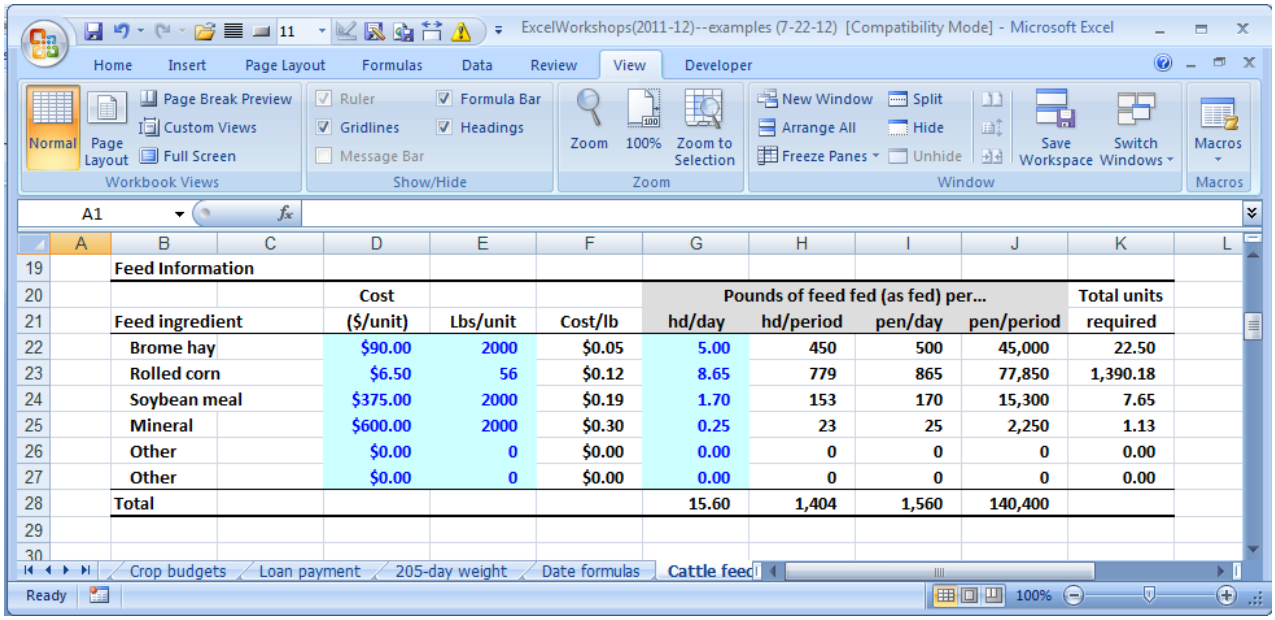
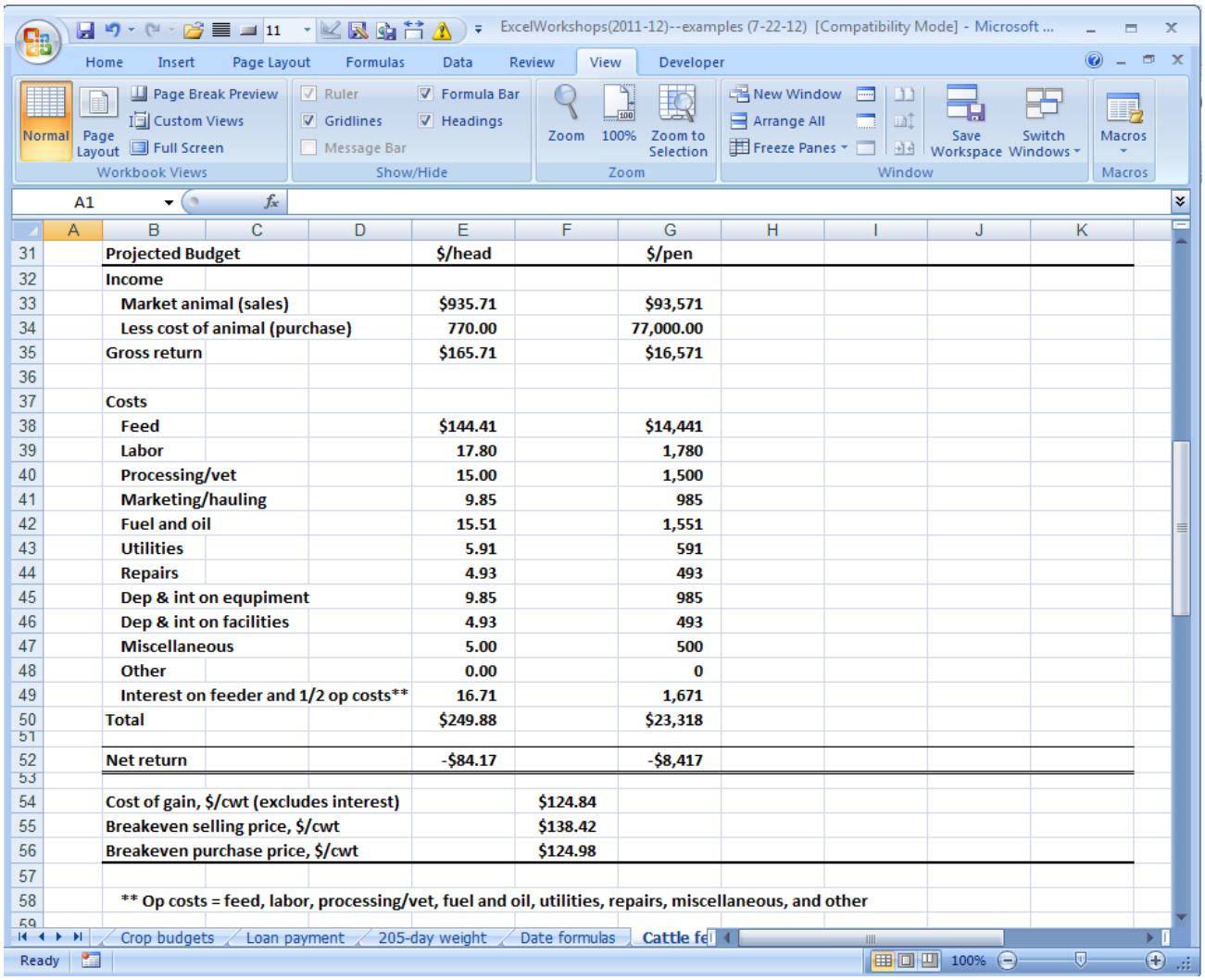
Cells
Editing
A1
Cattle Feeding Budget
Cattle information
Number of head purchased (pen) 100
Beginning weight, lbs/head 550
Purchase price, $/cwt $210.00
Feeding days (period) 90
Average daily gain, lbs 2.20
Death loss (DL), % 1.50%
Number of head sold 99
Ending weight, lbs/head 748
Projected selling price, $/cwt $152.00
Gain (including death loss), lbs/head 187
Value of gain, $/head -$35.09
Value of gain, $/cwt -$18.79
Cost Information
Cost ($/unit)
Level of cost*
% applies to DL calves
Feed N/A N/A 25%
Labor $0.20 1 25%
Processing/vet $15.00 2 100%
Marketing/hauling $10.00 2 0%
Fuel and oil $17.50 3 0%
Utilities $600.00 4 0%
Repairs $500.00 4 0%
Dep & int on equpiment $1,000.00 4 0%
Dep & int on facilities $500.00 4 0%
Miscellaneous $5.00 2 100%
Other $0.00 0 0%
Interest rate 7.75% NA NA
* Cost levels
1 = $/head/day
2 = $/head/period
3= $/pen/day
4=$/pen/period
Machinery costs
Crop budgets
Loan payment
205-day weight
Date formulas
Cattle feeding budget
READY
100%



19	**Feed Information**									
20			Cost			Pounds of feed fed (as fed) per...				Total units
21	**Feed ingredient**		($/unit)	Lbs/unit	Cost/lb	hd/day	hd/period	pen/day	pen/period	required
22	Brome hay		$90.00	2000	$0.05	5.00	450	500	45,000	22.50
23	Rolled corn		$6.50	56	$0.12	8.65	779	865	77,850	1,390.18
24	Soybean meal		$375.00	2000	$0.19	1.70	153	170	15,300	7.65
25	Mineral		$600.00	2000	$0.30	0.25	23	25	2,250	1.13
26	Other		$0.00	0	$0.00	0.00	0	0	0	0.00
27	Other		$0.00	0	$0.00	0.00	0	0	0	0.00
28	Total					15.60	1,404	1,560	140,400	



31	**Projected Budget**	$/head		$/pen	
32	**Income**				
33	Market animal (sales)	$935.71		$93,571	
34	Less cost of animal (purchase)	770.00		77,000.00	
35	**Gross return**	$165.71		$16,571	
36					
37	**Costs**				
38	Feed	$144.41		$14,441	
39	Labor	17.80		1,780	
40	Processing/vet	15.00		1,500	
41	Marketing/hauling	9.85		985	
42	Fuel and oil	15.51		1,551	
43	Utilities	5.91		591	
44	Repairs	4.93		493	
45	Dep & int on equpiment	9.85		985	
46	Dep & int on facilities	4.93		493	
47	Miscellaneous	5.00		500	
48	Other	0.00		0	
49	Interest on feeder and 1/2 op costs**	16.71		1,671	
50	**Total**	$249.88		$23,318	
51					
52	**Net return**	-$84.17		-$8,417	
53					
54	**Cost of gain, $/cwt (excludes interest)**		$124.84		
55	**Breakeven selling price, $/cwt**		$138.42		
56	**Breakeven purchase price, $/cwt**		$124.98		
57					
58	** Op costs = feed, labor, processing/vet, fuel and oil, utilities, repairs, miscellaneous, and other				
59					