

**AAE 320 Problem Set #1**

Name: ANSWER KEY

**Due Sep 21, 2022**

You run a cow-calf operation ([https://en.wikipedia.org/wiki/Cow%E2%80%93calf\\_operation](https://en.wikipedia.org/wiki/Cow%E2%80%93calf_operation)). Each year you save 15 of your heifer calves and raise and breed them for a year to replace cows in your herd. You are considering buying 15 bred heifers each year as replacements instead of raising your own. This would mean selling 15 additional heifer calves in the fall instead of keeping them and also avoiding the costs of caring for them for a year.

You could sell the heifer calves at a weight of 600 pounds for \$1.40 per pound (farmers would say \$140 per cwt <https://en.wikipedia.org/wiki/Hundredweight>). You could buy replacement heifers from a neighbor for \$1,400 each, already bred. By selling the heifer calves, you could avoid the costs of feeding and housing them for a year before they were bred heifers ready to add to the herd. You estimate that your cost per heifer per year are \$40 for pasture, \$250 for feed (grain, hay and mineral supplements), and \$100 for veterinary services, labor and breeding costs. [Based on Tigner 2018: <https://www.extension.iastate.edu/agdm/wholefarm/html/c1-50.html>]

- 1) Use the information given to conduct a partial budget analysis for your net gain from selling the heifer calves and instead buying new bred heifers from your neighbor as replacements.

Benefits		Costs	
<u>Additional Revenues</u> What will be the added revenues?  <i>Sell 15 more young heifers</i> $600 \text{ lbs/heifer} \times \$1.40/\text{lb} = \$840$ $\$840/\text{heifer} \times 15 \text{ heifers} = \underline{\$12,600}$		<u>Additional Costs</u> What new costs will be added?  <i>Buy 15 replacement heifers</i> $\$1,400/\text{heifer} \times 15 \text{ heifers} = \underline{\$21,000}$	
<u>Costs Reduced</u> What costs will be eliminated?  <i>Eliminate costs to care for heifers</i> $\text{Pasture} + \text{Feed} + \text{Services} = \$40 + \$250 + \$100 = \$390/\text{heifer}$ $\$390/\text{heifer} \times 15 \text{ heifers} = \underline{\$5,850}$		<u>Revenues Reduced</u> What revenues will be lost?  <i>None</i> <u>\$0</u>	
Total Benefits	<b>\$18,450</b>	Total Costs	<b>\$21,000</b>
Total Benefits – Total Costs = Net Gain			<b>–\$2,550</b>

- 2) Based on these results, is it more profitable to raise your own bred heifers or to buy them from your neighbor?

*The partial budget analysis shows a net loss of \$2,550 or \$170 per heifer if you were to switch to buying replacements rather than raising them yourself. You can take a 600 lb young heifer, feed and care for her for a year and have her bred and ready to enter your herd as a replacement cow for less than the market can sell you a bred replacement heifer. **You are better off continuing to raise heifers yourself.***

- 3) Each year you plant 700 acres: 350 in corn silage and 350 in soybeans. You are considering accepting a USDA cost-share payment to add a cover crop to your corn silage-soybean rotation (<https://www.sare.org/resources/cover-crops/>). After harvesting corn silage and after harvesting soybeans, you would plant a cover crop to start growing in the early fall. The next spring you would terminate the cover crop with a herbicide as you plant soybeans in the previous corn field and plant corn silage in the previous soybean field.

The USDA program pays \$32 per acre. Costs to buy cover crop seed and to plant it are \$37 per acre. Herbicides to terminate the cover crop will increase your costs by \$7 per acre. On average, cover cropping increases silage yield by 0.3 tons per acre and soybean yield by 0.6 bushels per acre. Use a silage price of \$45 per ton and a soybean price of \$14 per bushel.

[Based on Plastina et al. (2018): [https://lib.dr.iastate.edu/econ\\_las\\_pubs/621/](https://lib.dr.iastate.edu/econ_las_pubs/621/)]

Use the information given to conduct a partial budget analysis for all 700 acres if you were to participate in the USDA program and plant cover crops after you harvest silage and soybeans. Show your calculations in the space provided.

Benefits		Costs	
<u>Additional Revenues</u> What will be the added revenues?  <i>Value of Yield Gains</i> <i>Silage: 0.3 tons/ac x \$45/ton = \$13.50/ac,</i> <i>Soybean: 0.6 bu/ac x \$14/bu = \$8.40/ac</i> <i>Government Payment of \$32/ac</i> <i>Totals by crop</i> <i>Silage = \$45.50/ac x 350 ac = \$15,925</i> <i>Soybean = \$40.40/ac x 350 ac = \$14,140</i>		<u>Additional Costs</u> What new costs will be added?  <i>Buy and plant cover crop seed</i> <i>\$37/ac for both silage and soybean</i> <i>Extra Herbicide Costs</i> <i>\$7/ac for both silage and soybean</i> <i>Total by crop</i> <i>Silage = \$44/ac x 350 ac = \$15,400</i> <i>Soybean = \$44/ac x 350 ac = \$15,400</i>	
<u>Costs Reduced</u> What costs will be eliminated?  <i>None \$0</i>		<u>Revenues Reduced</u> What revenues will be lost?  <i>None \$0</i>	
Total Benefits	<b>\$30,065</b>	Total Costs	<b>\$30,800</b>
Total Benefits – Total Costs = Net Gain			<b>-\$735</b>

- 4) Based on these results, is participating in the USDA program and planting cover crops on all 700 acres profitable? Suppose you could choose to participate with only one crop on half of your acre. Which is the profitable crop to adopt a cover crop on: corn silage or soybeans?

*The analysis for all acres shows **a net loss of \$735** which is not much over 700 acres. If you look at the numbers by crop, the benefits are \$45.50/ac for corn silage and \$40.40/ac for soybean, while the costs are \$44/ac for each crop. This means that the gain is \$1.50/ac for corn silage, or \$525 and the loss is \$3.60/ac for soybeans, or \$1,260, implying that participating in the program is **only profitable for corn silage**.*