**You’ve Got Kale Teacher Information Page**

*Please send questions or return the surveys to:* *Farmsim@umces.edu*

*Running the game*

* Instruct students to open the Farming Simulation Game excel file (*filename PLAYFarmingSimulationGame).*
* Students must “enable content” in the game and accept any macros for the game to run properly.
* Direct students to read all instructions highlighted in yellow as they play the game. There are dedicated instructions for each tab/section of the game.

*Regarding the Overall Classroom Goal*

* Provide the students with the corresponding worksheet to record their annual results during gameplay (*filename FarmingSimYearlyResultsWorksheet*).
* The game can be played either individually, or in teams. There is a name section on the corresponding worksheet where students should write all names.
* Once all students have completed the game, sum up each team's Total Pounds of TN Reduced box.
* The total pounds of Nitrogen reduced that will return the stream to its previous recreational state is 1,300 lbs accumulated by each farm. Reducing TN at this rate as a class will return the state of the stream to the neighborhood swimming area, and the most abundant fishing spot in the town.
* For example, if there are 20 students in your class, each playing individually and accumulating 1,300 lbs on each worksheet in the Total Pounds of TN Reduced column, adding up each worksheet’s lbs reduced should be greater than or equal to 20 students \* 1,300 lbs = 26,000 lbs to restore the stream to a clean state.

*Post-Game Student Survey Expected Learning Outcomes (filename StudentSurvey)*

*To enhance the lesson, review the take home points with students below.*

1. How does implementing BMPs on your farm help the collective goal of restoring the community stream nearby?

*Possible answers from students:*

* You are implementing BMPs to reduce nutrients on your farm. The amount of nutrients that are reduced on your farm will contribute to a collective group goal of reducing nutrients to make the community stream clean/healthy.

**Take Home Points:** Nutrients such as total pounds of Nitrogen and Phosphorus end up in the community stream by runoff. By implementing BMPs, you are increasing your nutrient reduction contribution to the classroom goal of making the stream cleaner over time and better support aquatic habitat.

1. In what ways were you able to adapt your gameplay to a changing climate? Did you do anything to reduce drought risk?

*Possible answers from students:*

* Maximizing Soil Health Points (improving soil health) reduced profit loss from droughts.
* Implementing different amounts of various BMPs allowed me to explore what the best options would be to try to lessen my yield loss caused by drought.

**Take Home Point:** Weather risk is unpredictable and climate is changing. In the simulation, by implementing BMPs, soil health is improved, as reflected in Soil Health Points earned. By improving soil health, the impact of droughts on a farm’s crops are lessened, leading to a larger yield and profit for that year. The cost of implementing the BMP (including lost yield if land is taken out of production) must be weighed against the benefit of less damage to yield from droughts.

1. Throughout your 5-year gameplay, what strategies helped you to make reasonable profits or reduce more pounds of nutrients on your farm? Which practices were you more likely to choose, and why?

*Possible answers from students:*

* Implementing different amounts of various BMPs allowed me to explore what the best options would be to try to reduce nutrient runoff as much as possible. (Students might also have calculated partial cost-effectiveness per BMP by comparing pounds of nutrient reduction per dollar BMP cost, Soil Health Points per dollar of BMP cost, or Stewardship points per dollar of BMP cost).
* I chose a particular BMP because it reduced more nutrients.
* In order to gain more profit, I wanted to earn my Environmental Steward Points in order to be able to charge a price premium for my bushels at the end of each year.
* I was able to balance making reasonable profits and reducing nutrients by implementing various BMPs and earning 80+ Environmental Stewardship Points to gain the price premium. By implementing BMPs, I was able to increase my Soil Health Points, lessening the impact of droughts.
* I decided to accept government subsidies every year so that when I implemented BMPs, my costs would be 50% covered by the government.
* I chose to reduce nutrients as much as possible in order to make sure I contributed fully to the classroom goal of making the nearby stream fishable and swimmable.

**Take Home Point:** In order to reduce a large amount of nutrients on their farm, players would try to gain Environmental Stewardship Points by implementing more BMPs/BMPs that have high TN & TP reductions. Students will need to take caution to make sure the cost of the BMPs they implement offsets the price premium gained by earning 80+ Environmental Stewardship Points. In order to gain a large profit, students may decrease their costs by not implementing many BMPs at all. If their drought is minimal that year, they would have a large profit. If a drought is detrimental to their crop yield, students would see that implementing some BMPs increases soil health and therefore reduces yield impacts. Students meet all goals when they balance making a reasonable profit while reducing nutrients runoff from their farm to contribute to the stream health goals.

*Regarding Teacher Curriculum Requirements*

* This game will address the Human Suitability Standards HS-ESS3-1, HS-ESS3-2, HS-ESS3-3, HS-ESS3-4, HS-ESS3-6 and ETS1.B of the Next Generation Science Standards(NGSS), in addition it also addresses the AP Environmental Science Topic VI c (Economic Impacts) and Environmental Literacy Standard 7, topics E and F (Environment and Society)
* This game explores the tradeoffs between environmental stewardship and farm economics, along with the ability of best management practices (BMPs) to mitigate risks associated with climate change. This game also includes choices to voluntarily accept government cost-sharing for implementing BMPs demonstrating how such payments help farms balance farm and community goals. Players are given tools to weigh profitability and to contribute to a community goal of collectively reducing nutrient runoff, in order to make the local stream fishable and swimmable once again.