# **Text, company name  Description automatically generated with medium confidenceWorkshop**

**Overview**

The DELTA Model® is a global food system mass balance that uses information about current food production to predict the nutrition available to the average global citizen both now and in the future.

A challenge we face is our ability to sustainably nourish an increasing global population without exceeding the capacity of the planet. There are many different ways of approaching this challenge, and many suggestions for what the answer may be.

The DELTA Model® has been developed to help people learn and explore this challenge themselves by manipulating the major components of the food system to see the impact on the supply of key nutrients.

The model lets the user adjust the production of different food groups, the degree of food waste, and the global population to see the impact of these changes on human nutrition. The most recent version also calculates the cropland area required for food production.

Students will use the DELTA Model® to assess whether various food production scenarios can feasibly meet nutritional needs.

**Duration:**

1 hour to 2 hours max

**Learning outcomes:**

1. Identify challenges of creating a food system that meets global nutrient requirements
2. Balance changes in food production against nutrient adequacy

 *This WORKSHOP material has been authored by Dr Margaret Murray from Monash University.*



**Instructions for participants/students**

Log in to the DELTA Model® ([sustainablenutritioninitiative.com](http://deltamodel.sustainablenutritioninitiative.com/)) and use it to test a series of scenarios and answer questions. You will be able to answer all the questions using the information from the model, but you should also use your own knowledge of what is feasible from the global food system when analysing the outputs that the model provides.

**Questions:**

Problem 1

The 2018 baseline scenario has nutrient gaps for calcium and Vitamin E. You can try to resolve these by increasing production of certain food groups. Set Scenario 1 and 2 to 2018 Baseline, then change production of certain food groups in Scenario 2 to try to resolve the nutrient gaps. Use the Nutrient Density tool (under the Helpful tab) to find food groups rich in specific nutrients.

1. Which food groups did you increase and by how much to meet the global calcium and vitamin E requirements?
2. Do you think this is a viable option in the current food system?

Waste can be increased or decreased in the DELTA Model®, at the supply chain or in-home level. The waste of individual nutrients can be seen under the Waste tab. Changing waste quantities has varied efficacy in resolving nutrient gaps, depending on the nutrient. Re-set both Scenario 1 and 2 at 2018 baseline and see if you can correct the calcium and vitamin E deficiencies by adjusting the amount of waste in Scenario 2.

1. Were you able to correct the nutrient gaps by simply reducing waste? If so, how? If not, what % of the RDI was still lacking?
2. What do you think about shifting the global food supply towards zero waste? Is this achievable?

Problem 2

There is much discussion about drastic changes to food production and consumption from health and environmental perspectives. Use the DELTA Model® to find out whether nutrient requirements can be met if specific food groups are removed. Set Scenario 1 and 2 to 2018 baseline and then set one food group to 0 production in Scenario 2.

1. Which food group did you select and why?
2. Did the nutrient gaps change as a result? Was this what you expected?

Can you correct those nutrient gaps by increasing production of other food groups? Increase the production of other food groups in Scenario 2 to see if you can fix the nutrient gaps created.

1. Were you able to correct the deficiencies?
2. Which food groups did you increase and by how much?
3. Do you think that is an achievable change within the current food system?
4. Think about those changes in the context of your own diet. How would you feel about eating that much more of those food groups? Or about removing whole food groups from your diet?

Problem 3

It has been posed that a vegan diet is the most sustainable diet. Have a look at a comparison between a food system like our current one and a vegan food system. Set Scenario 1 as ‘2030 Scale up Fish Constrained’ and Scenario 2 as ‘2030 No animal’.

1. What additional nutrient gaps appear in the 2030 scenarios? How does increasing the production of plant food groups affect these gaps?
2. Lysine is often a limiting indispensable amino acid in the human diet. What food group is the biggest contributor of lysine in the no meat scenario and roughly how much does it provide? How does this compare to the other scenario? (You can find this in the ‘Nutrient Breakdown’ tab)

You will notice that the amount of feed supply under the vegan scenario becomes zero. Look at the ‘System Change’ tab to see which of these foods that used to go to feed are now being consumed by humans.

1. What are the top 5 food groups in terms of the food ratio change, indicating an increased ratio of those products being used as food, in the no meat scenario compared to the other scenario?

Problem 4

Food waste is a big problem in our current food system. Many have recommended the need to reduce food waste by 50% in order to reach targets for a sustainable food system. Let’s see what that would look like in the year 2030. Set Scenario 1 and 2 to ‘2030 Scale up Fish Constrained’ and the year to 2040. Then in scenario 2, reduce the waste in the supply chain and in-home to 0.5.

1. Which nutrients that do not meet the target in scenario 1, met the target once waste was halved? Which nutrients still do not meet the RDI once waste has been reduced?
2. How much higher is the Total Food Supply (after waste) in scenario 2 compared to scenario 1? How much has waste has been reduced in total, in millions of tonnes, between the two scenarios?

Look at the ‘Balance Sheet’ tab to see how the reduction in waste (losses and in-home waste) alters the amount of each food product category that ends up as food.

1. After food, what is the second largest end use for:
	1. Cereals
	2. Fruit
	3. Eggs
	4. Nuts
	5. Pulses
2. After stage 3 processing (move the slider along to number 3), for which food groups is waste (losses & in-home waste combined) still the second largest end use?

Problem 5

The DELTA Model® makes bioavailability adjustments for protein and the indispensable amino acids. By switching off bioavailability in one of the scenarios, you can see the importance of considering this factor. Set both scenarios to 2030 No meat, Year to 2050, and then turn bioavailability off in one of the scenarios.

1. For which nutrients does this alter whether adequate amounts are available to meet the target?
2. Why is it important to consider bioavailability in this type of modelling?

Problem 6

There are many other aspects to a sustainable food system beyond nutrition, like the environmental footprint of the food system. The DELTA Model® also calculates the cropland footprint of plant food production for each scenario.

Reset the scenarios to defaults, and the set scenario 2 to the 2030 Scale-up Fish Constrained. Look at the two charts under the Cropland Use tab.

1. Which crops require the greatest amount of land to grow? Does this match with the crops that have the highest production values?
2. There are error bars on the charts that show the uncertainty in the model prediction. Where might this uncertainty come from?

Explore the other tabs under Cropland Use.

1. Which crops are used most as animal feed? The largest quantities of land are used to grow feed for which animal groups?

If you complete these problems with time to spare, have a go at making up some of your own scenarios and see what happens!

