

### **Agriculture challenge #1**

Most cattle have the ability to grow horns. These horns get in the way when many cattle are housed together. Dehorning a cow is a tedious and expensive process and one that farmers do not want to do. How might you produce cattle without horns?

### **Agriculture challenge #2**

As a farmer, cattle bring in a large profit when sold for food products. The more lean muscle that a cow has, the greater the selling price. How might you produce a cow that has more lean muscle mass?

### **Agriculture challenge #3**

Egg allergies are very common in humans. Most egg allergies are associated with a specific protein found within the egg. How might you produce a hypoallergenic egg?

### **Agriculture challenge #4**

Wheat is a crop that has to be planted annually. Farmers that grow wheat will have to harvest the wheat and then plant more wheat for the next year. How might you produce wheat that is perennial (meaning that it comes back each year without having to be planted again)?

### **Agriculture challenge #5**

Farmers that sell chickens for consumer use have a very profitable business. So much so that poultry farmers have been tasked to produce chickens with more lean muscle mass at a higher rate than normal which sometimes causes the chickens to have brittle bones. How might you produce a chicken with more lean muscle mass in a shorter period of time?

### **Agriculture challenge #6**

When an apple is cut open, oxidation causes the interior of the apple to turn brown. How might you produce an apple that does not turn brown once it has been cut and allowed to sit in open air?

### **Agriculture challenge #7**

When going to the grocery store, you notice many varieties of apples. Some apples are green, some are red, and others are yellow, yet most of these apples are still green/yellow on the inside once they are cut open. How might you make an apple that is red on the outside and red on the inside?

### **Agriculture challenge #8**

When keeping crops safe from bugs, many farmers use pesticides. Sometimes those pesticides not only kill harmful insects to the crops but also hurt the crops themselves. How might you create herbicide-tolerant crops?

### **Agriculture challenge #9**

A farmer did not want to use insecticides on his crops. He did not think that the insecticides would be good to be on the plants once he sold them to a farmers market. How might you create a plant that had a natural insecticide already in it?

### **Agriculture challenge #10**

A farmer did not want to produce brown or white rice. She wanted a rice that was a different color, specifically gold. How might she produce a rice crop that was golden in color rather than white?

### **Agriculture challenge #11**

A country noticed that many of its residents were deficient in the nutrient Iron. A farmer decided that he could increase the amount of iron found naturally occurring in his rice crop. How might you create a rice crop with additional nutrients like iron?

### **Agriculture challenge #12**

A corn farmer needed his crop to be both herbicide tolerant and prevent insects. He decided that both of these characteristics would create a great crop. How might you produce a corn crop that was both tolerant to herbicides and a natural insect prevention?

### **Agriculture challenge #13**

In the 1990s, ringspot virus was killing most papaya crops. Not only was this detrimental to the food industry, but also for the farmer producing papaya for retail. How might you create a papaya crop that was resistant to the ringspot virus?

### **Agriculture challenge #14**

A soybean farmer wants to increase his crop yield and reduce the use of herbicides on his soybean crop. How might you both increase the crop yield of the soybean farmer and decrease the use of herbicides on the crop?

### **Agriculture challenge #15**

Corn is a crop that needs nitrogen added to it in order to grow to its full potential. Soybeans are legumes (symbiotic relationship with Rhizobia bacteria), so they do not need added nitrogen. How might scientists create corn that is a legume?

### **Agriculture challenge #16**

Since the development of herbicides, plants have been adapting to resist such chemicals. Herbicide resistance has increased due to the increase in genetically modified crops that are herbicide resistant. How might scientists develop a new control mechanism that decreases current herbicide-resistant weeds?