WHAT DO THESE THREE PRODUCTS HAVE IN COMMON?

Things to Consider: How are they manufactured? Why are they manufactured?
What do the manufacturers need to know in order to make these products?

Product: Human insulin	
The science behind it	In the laboratory, the gene for human insulin (a protein found in the pancreas) is inserted into yeast or bacteria, from which large quantities of the human insulin molecule are then manufactured.
Characteristics	Insulin regulates the use and storage of nutrients (food), particularly carbohydrates. Human insulin results in fewer immune rejections and side effects than does porcine (pig) insulin modified for use in humans.
Uses	To treat diabetes.

Product: Recombinant Bovine Growth Hormone (rBGH)	
The science behind it	rBGH is a genetically engineered version of a hormone (bovine somatotropin, or bST), which is found in the pituitary gland of cows and controls milk production.
Characteristics	rBGH can increase cows' milk production by as much as 20-30%.
Uses	To farm and to make dairy products.

Product: Spider silk	
The science behind it	One method involves inserting a gene from an orb-weaving spider into a fertilized goat egg. The resultant "spider-goats" produces milk that can be manufactured into strong fibers.
Characteristics	Elastic, lightweight fiber five times stronger than steel.
Uses	To make flak jackets, rope, textiles, sutures, artificial tendons, bandages for burn victims.

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Product: Golden rice	
The science behind it	Genes for making beta-carotene are taken from daffodils and inserted into the genome of a strain of rice.
Characteristics	Contains beta-carotene, which forms vitamin A.
Uses	To protect undernourished people from blindness caused by a lack of vitamin A.

Product: Edible vaccine	
The science behind it	Specific antigen genes are inserted into cells taken from plants such as tomatoes and potatoes; the genetically enhanced cells are then grown into new plants that express the antigen genes and can be used as vaccines.
Characteristics	Can be administered without needles; do not need refrigeration for storage or transportation; can be grown in countries without manufacturing facilities.
Uses	To treat Norwalk virus (which causes severe diarrhea); potential uses include treatment of measles, Hepatitis B and malaria.

Product: Bt crops	
The science behind it	*Bacillus thuringiensis* (Bt) is a bacterium that is toxic to some insects. In the laboratory, the gene that produces Bt's toxic effect is inserted into the DNA of plants such as corn, cotton, and potatoes.
Characteristics	Bt crops produce an insecticide protein thousands of times more powerful than the chemical insecticides normally sprayed on crops.
Uses	Prevention of crop destruction by harmful insects.