|  |  |
| --- | --- |
| **Pros**  **GMPS**   1. Help farmers **grow better crops at a faster** which allows for cheaper food for us. Scientists have the ability to grow several generations in one year, avoiding the wait for seasons to change. 2. Help **feed the extra 2 billion people** that will fill the planet by 2050 3. Plants **can resist a drought or cold** snap 4. **Less likely to die from disesase** 5. Not using GMOS **would push us back 40 to 50** years in production 6. **Less stress on the environment**. Less tilling of crops and lower amounts of toxic pesticides can be used due to ability to resist weeds 7. **Enhances biodiversity** by allowing weeds to continue growing for longer thus providing nutrition for animals. After weed kill a mulch forms which hosts a thriving population of insects, arthropods etc. 8. **No insecticidal sprays** needed on crops that have insecticidal Bacillus thuringiensis (Bt)-toxin genes engineered into them.   Plants with Bt or other insecticidal genes are likely to give rise to lower levels of mycotoxins in the final food product. Less insect damage means less opportunity for fungi to infect the plant and bring toxic substances.   1. Genetic engineering produces crops which are **pest-resistant and have a longer shelf life.** Engineered seeds can endure harsh climatic conditions an are resistant to pests. At-DBF2, a plant gene, can be inserted into tobacco and tomato cells to increase their survival in harsh climatic and soil conditions. Biotechnology may be utilized to slow down food spoilage process. This results in a greater shelf life of vegetables and fruits. 2. Genetic modification can be utilized to produce **entirely new foods.** In food, genetic engineering is able to produce completely new substances like proteins and other **nutrients**. Modification of gene in foods can increase their **medicinal value**. This makes home-produced edible vaccines. 3. **Viral bananas** that inoculates people against Hepatitis B. Successfully altered carrots, lettuce potatoes, and tobacco. Efficient method of carrying vaccine   **Genetically modified animals**   1. Spider silk as approximately a million and a half uses and more our being found every day. Things include bulletproof vests, artificial tendons, bandages, computer chips and fiber optic cables for surgery. It takes a long time to harvest silk from spiders. GE has allowed for **spider DNA to be inserted into the goat**, where it replaces the milk gene. Now spider silk can be produced at high values and millions of lives are affected 2. **Super Salmon** are atlantic salmon that can grow twice as large and fast. It is refered to as the AquaAdvantage salmon and is created by using a gene from the Chinook salmon and the eelpout. It has FDA approval 3. **Environmentally friendly pigs**:modified to absob more phytic acid which reduces the amound of phosphorous waste produced by the pig. Thus reducing the phosphoours pollution that comes from manure on the ground, one of the many ways hog farms deal wih excess pig waste. This helps safe contanmination of water sources that causes algae growth, taking out oxygen out of the water and suffocating fish. 4. Potential to **use eggs against cancer**. Contains drug proteins used aainst cancer, it is cheap and efficient. 5. **Humanized cow milk** that takes spliced human genes and produces human braest milk within the cows similar to a lactating human mother. This gives an alternative to baby formula and helps women that cannot produce their own. 6. Cabbage that brings in the AalT gene that produces the toxin that scropions that I only **effective against insects**, not humans 7. **Pigs with human organs** have been developed, (xenotransplantation). There used to be a problem that an enzyme caused rejection in the human body, but a researcher from University of Missouri has cloned four pigs that no longer produce the enzyme, making transfer less likely to cause rejection.   **Human genetic engineering**   1. **Tumor necrosis factor**. Treatment for certain tumor cells 2. **Interleukin-2 (IL-2)**. Cancer treatment, immune deficiency, and HIV infection treatment 3. **Prourokinase**. Treatment for heart attacks 4. **Taxol**. Treatment for ovarian cancer 5. **Interferon**. Treatment for cancer and viral infections 6. Vaccines are made by recombinant hosts 7. **Vaccienes** created are much **more safe** ad controlled than a disease-causing microbe transferred into the host. 8. **End Disease:** Human genetic engineering relies heavily on science in technology. It was developed to help end the spread of diseases. Using human genetic engineering it could be possible to change the way genomes are constructed to end some diseases. Genetic mutations can be to blame for certain diseases including Cystic Fibrosis, but with the help of human genetic engineering it could be possible to end this disease completely. If the complete benefits of human genetic engineering therapy are ever seen, it could have a huge impact on disease as a whole. 9. **Longer Life:** Without certain diseases to increase death rates and decrease life span, it would be possible for more individuals to live longer and healthier lives. This means that human genetic engineering has the potential to improve the quality of life and allow for longer life spans. Reversing some of the cellular causes for decline of the body could be possible if strides are made with human genetic engineering. 10. **Eliminating Illness and Disease in Unborn Children:** One of the largest benefits of genetic engineering is the prospect of helping cure illness and diseases in unborn children. Having a genetic screening with a fetus can allow for treatment of the unborn. Overtime this can impact the growing spread of diseases in future generations. | **Cons**  **GMPs**   1. **How do we know** exactly what we are eating and what if in the long run the food we consume hurts us, relative to helping us. Just like in the case of the flavor savor tomatoes 2. They **aren’t natural and organic**. Like Roundup Ready corn, GMOs can be sprayed with toxic chemicals, this is going into the bodies of our children, our loved ones. Do we really want that? The WHO as many of you know is the World Health organization, has classified the main chemical used in Roundup as a probable carcinogen. (Webmd) 3. There is no requirement for companies to **label their products** if they are GMO here in the US, how are we supposed to know what we are eating. 4. **Creates superweeds** by having crops resistant to weeds, it makes the weak ones die, but the strong ones build up 5. **Lack of testing on GMOs**, takes a long time for effect of the cause of the GMO to show up in your body 6. The **massive contamination** in 2000 of the USA corn (maize) crop and human food chain by Starlink, a variety which is not approved for human consumption, shows that genetic pollution from transgenic crops to non-transgenic crops and food is inevitable. Starlink maize produces the Cry9C protein which may be a human allergen.   Two other **major contaminations** of ordinary seed (maize and oilseed rape (canola)) with GM seed have already occurred leading to emergency recalls of the product.  Sustainable organic agriculture creates much needed jobs in depressed rural economies.   1. In the case of the **Viral bananas**, there are plenty of ways vacinations go wrong, allergic reacions, not working. Viruses develop, that is why you have to get a vaccine every year. Will these bananas be continuously developed to keep up with the genetic arms race? It isn’t so easy to avoid something in your food, especially when they aren’t required to be labeled.   **Genetically modified animals**   1. **Singing mice** that sing like a bird. This is sick and is used solely for our personal pleasure. This was made in Japan with the only purpose to speed up evolution. This is interfering with nature 2. Modified with human genes, when is an **animal no longer an animal**, but is closer to human? 3. There are potential risks of using animals as “**medical equipment**” rather than as “animals” allowing companies to get around animal right laws. 4. Is giving **genetically modified milk to your child really a safe thing**? How can you know that lasting effects will not occur in such an essential stage in development 5. How long would it take for the genetic makeup of the **cabbage** to change that produces to high of a toxin of the AalT gene that could make it actually toxic in humans? 6. Pigs grown as organ factories?   **Human genetic engineering**   1. Individuals still end up with the disesase that the vaccine was supposed to treat 2. **Ethical Issues:** Many of those opposed to human genetic engineering have their opinion based on ethical views. The belief that god should have ultimate power and we should not be altering nature is what many think should halt the progression of human genetic engineering. The power to shape the human race should not be left up to us humans, because there is divine intervention at work. 3. **Safety Issue**: There are still many different unknowns linked to human genetic engineering. This brings up issues involving of safety. Getting genes into the human body is a complex process that could go bad very easily. The extent to the consequences if it goes bad are not fully known and could be quite devastating. The success rate is also something that brings up concern. 4. DARPA is interested in human genome research that investigates biological systems that cros multiple scales of biological architecture and function on molecular and genetic levels. They have created 99% of the world’s deadly robots and their purpose is to create a super human that can be used in warfare. Can anyone say zombie human **supersoldiers**?   Some feel that more research needs to be done to further human genetic engineering technology, but others feel that this type of engineering has no place in society at all. |

Bioethcs Pros and cons