Biotechnology

Technology

Cows milk is made up of water, sugar, fat, proteins, vitamins and minerals. Casein is a key protein making for 80% of the total protein found in milk. The protein casein holds nutritional value and processing properties, thus making it the most valuable component in milk. Milk from casein transgenic cows produce double the casein than from traditional cows. These cows have both animal and human benefits such as: * Improving the health growth and survival of calves * Prevent animal diseases such as mastitis * Milk for humans is healthier * Assist the processing of milk into dairy products, such as cheese.

Making a transgenic cow: over all process The first step used in making a transgenic cow is to design the gene construct. This will contain all the information needed for transaction as well as the desired gene expression. The gene construct will only be active in the mammary glad and will only be expressed at late pregnancy and du ring lactation. The gene construct, a unit of DNA, contains an antibiotic resistance gene. This is due to the treatment of cells after the gene transfer with an antibiotic. This allows for those cells that successful express the BAR gene to be only ones to survive.

The gene construct will also include tissue specific promoter sequence. This 'promoter' signals the start the expression of the protein in cells of the mammary gland in lactating cows. The desired gene, such as bovine casein is also in the gene construct, along with a stop sequence, which defines the end of the information for making the specific protein. The second step requires the transgender to be sourced. Originally the gene would have been extracted from an organisms DNA but scientists can now simply synthesis the desired gene (if the sequence is known) in a lab.

Making the gene construct is next step in transgenic process. A vector, small piece of DNA, is often used for such a task. Once the foreign piece of DNA is inserted into the vector, it can be sent from lab to lab, stored, manipulated or copied. This newly made gene construct can be incorporated into the genome of a bovine in the fourth step called Transaction. The gene construct must be insert via membrane into the cell. Microinstruction, electrification, chemical portion, laser portion or gene scissors can be used to insert the gene construct into the cell.

As mentioned in step one, after transaction the cells are treated with an antibiotic in this fifth step. Cells without gene construct will have no resistance to the antibiotic and die, leaving cells that positively contain the gene construct. Now a transgenic embryo needs to be created using nuclear transfer. A transgenic bovine is fused with a bovine octet that has it chromosomes removed. They are fused together with the help of an electric pulse. The transgenic cell's chromosomes are reprogrammed to direct development into an embryo.

Once the transgenic embryo has developed around 1 50 cells (after a period of seven days) it can be into transferred into surrogate cow for further development. The embryo ill develop to full term (a gestation period of months), the surrogate cow will give birth to the transgenic calf. In order to confirm that the calf is transgenic scientist check using a Polymerase chain reaction (PC, amplifies a single or a few copies a piece of DNA) so to determine presence or absence of the transgender. When the calf is lactating, its milk is checked to confirm whether or not the protein is being expressed.

Important procedures: Transaction Transaction is the introduction of new DNA into a cell. This can be achieved by using stimulus that interferes with the membrane and allows, for a short time, for the DNA o enter a cell or by chemical reaction reagents. Two such methods are electrification and microinstruction. Electrification is a simple process where by the cell is exposed is exposed to a high-intensity electric field that temporarily destabilize the membrane as seen in step one of the diagram.

This makes the cell permeable to exogenous molecules present in the surrounding media. The gene construct within a vector can move into the cell through these holes as seen in step 3 of the diagram. When the electro field is turned off, the pores in the membrane reseal, enclosing the DNA inside as seen in the final Step of the diagram. An advantage of using electrification is that it doesn't seem to alter the biological structure or function of the target cells. This method is also highly efficient and easy to perform.

Though cell morality will increase if not used in suboptimal conditions. Microinstruction is another form of transaction and involves directly injection of naked DNA. This form of transaction is costly and technically demanding. Each cell must be separately injected but this type of transaction can be used for many different animals. Regulating transgenic cows: benefits and consequences of Transgresses In New Zealand, transgenic cows are classed as new organisms and are regulated by the Hazardous Substances and New Organisms (HASH) Act.

The Environmental risk management Authority or ERM place restrictions or require certain standards to be followed. Transgenic cows are housed in separate facility from traditional cows and have there own milking sheds. The transgenic cows are not allowed to their facilities. This is to make sure transgenic cattle and traditional cattle do not accidentally breed together, unintentionally passing new genes to into the traditional population. A theory called the Trojan gene theory.

This theory shows that some transgenic organisms offspring have a disadvantages, such as poor health or fertility, compared to the natural counter parts, their survival rate is thusly quite low. If a transgenic organism was to intentionally escape and breed with a natural population it may cause the extinction of entire population. According to this theory it would only take a few transgenic organisms. Transgresses also creates serious problems for biodiversity All waste materials from transgenic cows must be disposed of on site. Milk treated with fermentation, then diluted and sprayed over the pasture.

Searching monitors the soil, pasture and groundwater on facilities to assess the impact of transgenic cattle on the environment, ensuring that no transgress from the cattle have been transferred to soil bacteria in a process called horizontal gene transfer. Transgenic will allow for larger herds with specific traits. The traditional methods of breeding such as selective are time consuming and difficult, as seen in the diagram to the right, transgenic is far less time consuming. This is because selective breeding takes many generations to create a new strand of cattle where as ranginess doesn't.

With modern molecular technology it makes it possible to develop traits in animals in a shorter time. Scientists can improve livestock genetically using Transgenic. In the past farmers would use growth hormones to spur the development of animals but this technique is problematic. As technology and methods improve, Transgresses will be a perfect contributor to human and animal advancement. But the process holds many ethical and biological implications. But this method can be seen to be more effective and superior to selective breeding.