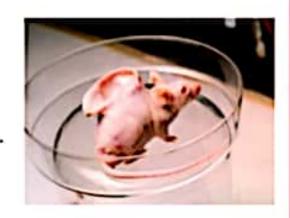
# IMPORTANCE OF TRANSGENIC ANIMALS

- Medical importance
  - Disease model
  - Bioreactors for pharmaceuticals
  - Xenotransplantation
- Agricultural importance
  - Disease resistant animals
  - For improving quality and quantity of milk, meat, eggs and wool production
- Industrial importance
  - Toxicity sensitive transgenic animals to test chemicals.
  - Spider silk in milk of goat

## TRANSGENIC MOUSE

#### Alzheimer's mouse

- In the brain of Alzheimer's patients, dead nerve cells are entangled in a protein called amyloid.
- Mouse made by introducing amyloid precursor gene into fertilized egg of mice.



#### Oncomouse

- · Mouse model to study cancer
- Made by inserting activated oncogenes.

#### Smart mouse

- Biological model engineered to overexpress NR2B receptor in the synaptic pathway.
- This makes the mice learn faster like juveniles throughout their lives.

## TRANSGENIC LIVESTOCK

- Bioreactors whose cells have been engineered to synthesis marketable proteins.
- More economical than producing desired protein in cell culture.

#### Transgenic cattle

- Transgenic cows are made to produce proteins lactoferrin and interferons in their milk.
- Prion free cows resistant to mad cow disease.

#### Transgenic sheep

For good quality wool production.

#### Transgenic goat

 Goats that could express tissue plasminogen activator, anti thrombin III, spider silk etc in milk.



# Transgenic chickens

- Methods:
  - Infecting embryos with a viral vector carrying the transgene
  - Transfer human gene into rooster sperm
- Produces 0.1g of human protein in each egg
- Advantages:
  - Cost effective
  - Add correct sugars to glycosylated proteins (unlike E.coli)

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# Transgenic cow

- 1990: World's 1<sup>st</sup> transgenic cow – "Herman" the bull (Netherlands)
- Herman carried the human lactoferrin gene (pronuclear microinjection)



- Cow's milk & artificial formula do not naturally contain lactoferrin
- Other RPs in transgenic cow's milk lysozyme, human lactalbumin, rATIII, Factors VIIII & IX etc

# ISSUES RELATED TO TRANSGENIC TECHNOLOGY

- Blurring the lines between species by creating transgenic combinations.
- There may be health risks associated with transgenics.
- There may be long term effects on the environment when transgenic animals are released into the field.
- Various bioethicist argue that it is wrong to create animals that would suffer as a result of genetic alteration.

## RECENT TRENDS

- Transgenic goats engineered to produce human breast milk (Journal Transgenic Research, August 2012)
  - University of California scientists created the transgenic goats by transferring human genes for breast milk enzymes and proteins into goat embryos.
  - Produce 60 percent of the lysozyme and lactoferrin found in human mother's milk.
  - For babies of mothers who aren't present, or can't nurse them, milk from these transgenic goats could provide the next-best alternative.
- Bioluminescent transgenic mouse model for study mammary gland tumour development. (PLoS ONE, aug 2012)
  - Research done by Cancer Biology and Therapeutics Group, Ireland

Step 2 - Introduction of Transgene into the animal

3 methods -

- 1. RETROVIRAL VECTOR METHOD.
- 2. DNA MICROINJECTION METHOD (PRONUCLEUS METHOD)
- 3. EMBRYONIC STEW CELL-MEDIATED
  SITE-DIRECTED MUTAGENESIS