Animal Biotechnology How, What and Why?

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Animal Breeding – selection of dog breeds

What is Biotechnology ?

Biotechnology - The application of science and engineering to living organisms.

Animal biotechnology

- Artificial selection (breeding programs)

How do farmers make their selection decisions – which bull to use?

Holstein - Dairy

Angus - Beef

DREAM ON   29SM0373

CNS DREAM ON L186 ASA 2144976

View Support Photos

NICHOLS LEGACY G151
— NICHOLS BLK DESTINY D12
— NICHOLS DEBRA D81
CNS SHEEZA DREAM K107W
— SRS FRANCHISE F601
— NICHOLS JOLIETTE 107W

2007 GENETIC TYPE SUMMARY

	STA	#HEAD	-2	-1	0	1	2
Stature	-0.4	PE					
Capacity	0.2	PE					
Body Length	0.4	PE					
Muscling	0.6	PE					
Rear Legs	-0.8	PE					
Feet & Pasterns	0.1	PE					
Femininity	0	PE					
Udder Attachment		PE					
Udder Depth		PE					
Teat Size		PE					

**Comments: Pedigree Estimate**

Profitable and Marketable

- Heterozygous black, DNA tested homozygous polled
- A leader for API (top 2%) combining outstanding calving ease, maternal calving ease, sensible growth and strong carcass traits
- The overall look and kind of his progeny make them extremely popular and easy to sell
- The best return on investment for your semen dollar

AMERICAN SIMMENTAL SIRE SUMMARY FALL 2007

TRAIT	CED	BW	WW	YW	MCE	MILK	MWW	STAY
EPD	+15.7	-0.9	+35.3	+58.6	+13.3	+6.9	+24.5	+16.3
ACC	.88	.95	.92	.90	.77	.80	.81	.15

TRAIT	CW	YG	MARB	BF	REA	SHR
EPD	-10.5	-.01	+.30	+.03	+.11	-.01
ACC	.66	.66	.66	.71	.64	.08

Individual Performance		
BW	78	
205	886	N/A
365	1,435	N/A
SC	40	12 Mo.
YFS/FS	6	
Weight	2,300	Mat.
Height	58	Mat.
Born: 11/21/01		

2009 Beef Sire Directory
Quality Without Compromise

service   science   success
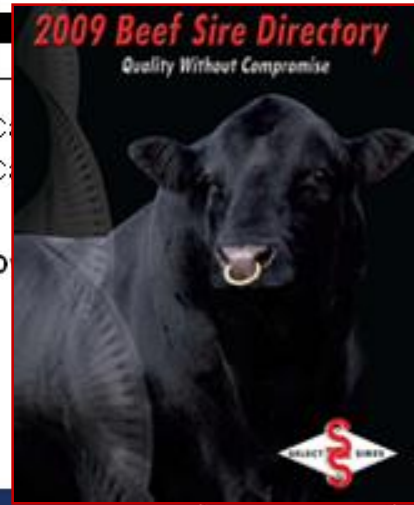
Animal biotechnology

- Artificial selection (breeding programs)
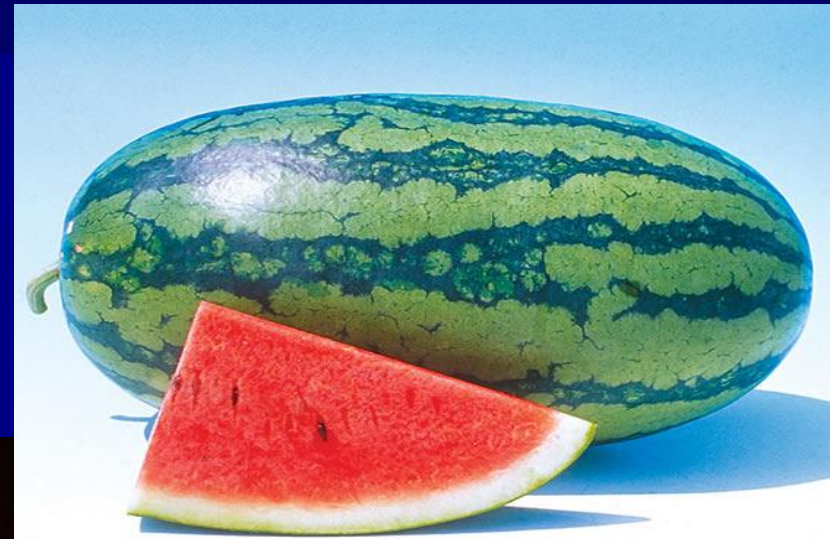- Artificial Insemination

- **Cloning**
- **Genetic engineering**

Have I ever eaten a clone? YES

What is a clone ?

- <u>Cloning</u>, in horticulture and biology, any organism whose genetic information is identical to that of a "mother organism" from which it was created.

- Food from clones has been a part of our diet for years. Many common fruits (e.g., pears, apples, oranges and lemons) and several vegetables (e.g., potatoes and truffles) are clones.

What about cloned animals?

Cloning by "natural reproduction" (monyzgotic twins)

Cloning by embryo splitting – has been done for 20 years

Cloning by Embryo Splitting

Embryo is split to form two half-embryos
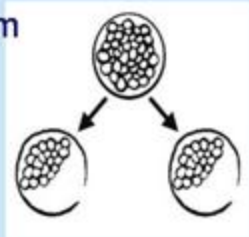
Embryos are transferred to an unrelated surrogate mother

Pregnancy is monitored by ultrasound

Sheep gives birth to identical twins
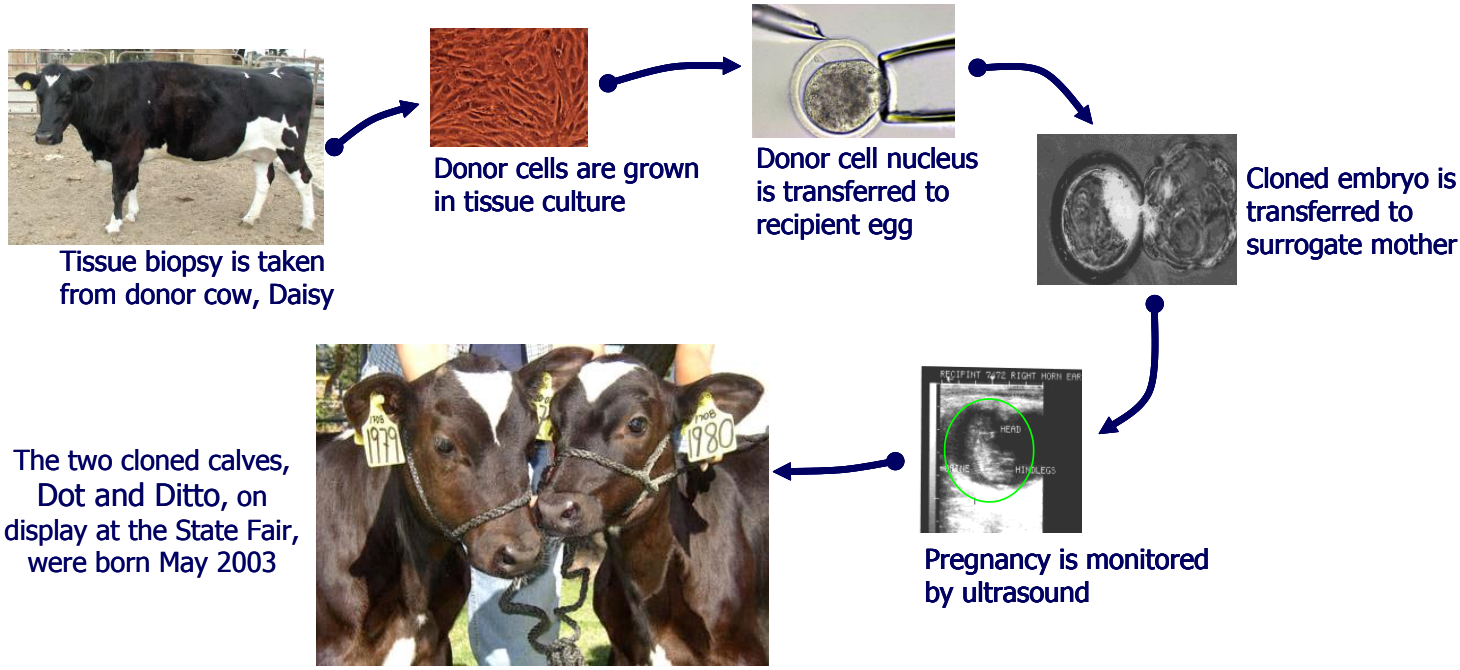
Dolly the first adult cell cloned (1996)

Cloning by "Nuclear Transfer" (take nucleus and transfer it)

Embryo Transfer Laboratory

Cloning by Nuclear Transfer at UC**DAVIS**

Tissue biopsy is taken from donor cow, Daisy

Donor cells are grown in tissue culture

Donor cell nucleus is transferred to recipient egg

Cloned embryo is transferred to surrogate mother

Pregnancy is monitored by ultrasound

The two cloned calves, Dot and Ditto, on display at the State Fair, were born May 2003

Many animal species have been since been cloned from adult cells

Who's Buying?

$20,000

Regancrest Emory Derry died unexpectedly.
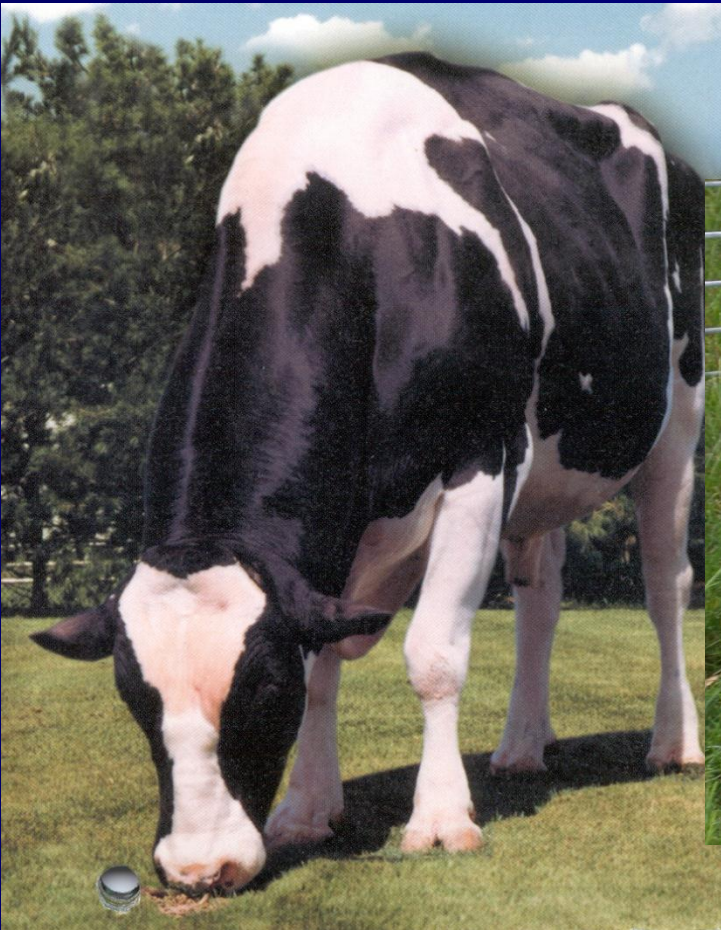
Who's Buying?

- **Full Flush**

  Unable to supply market demand for his semen

Who's Buying?

Specialty Cattle Producers

Starlight: record 77 inches 'tip to tip'

What's up in the blogosphere ?

- Posted **by Christina**
  "Will cloned food sources by labeled as such? I am certainly not in support of it, will avoid it and will continue to support organic food sources as much as possible. What are our leaders thinking and why, as a US Citizen and registered voter, don't I get a say in this? Very disturbing!"

- Posted **by Quignoff**
  "There are many people that obviously do not know that we eat cloned, genetically engineered foods every single day. Nearly all of the plant foods that we eat have been engineered. Besides, our bodies have no idea that the food it's eating is cloned or not; dna is dna is dna as far as our stomachs and the microbes that live there are concerned."

- Posted **by Troy**

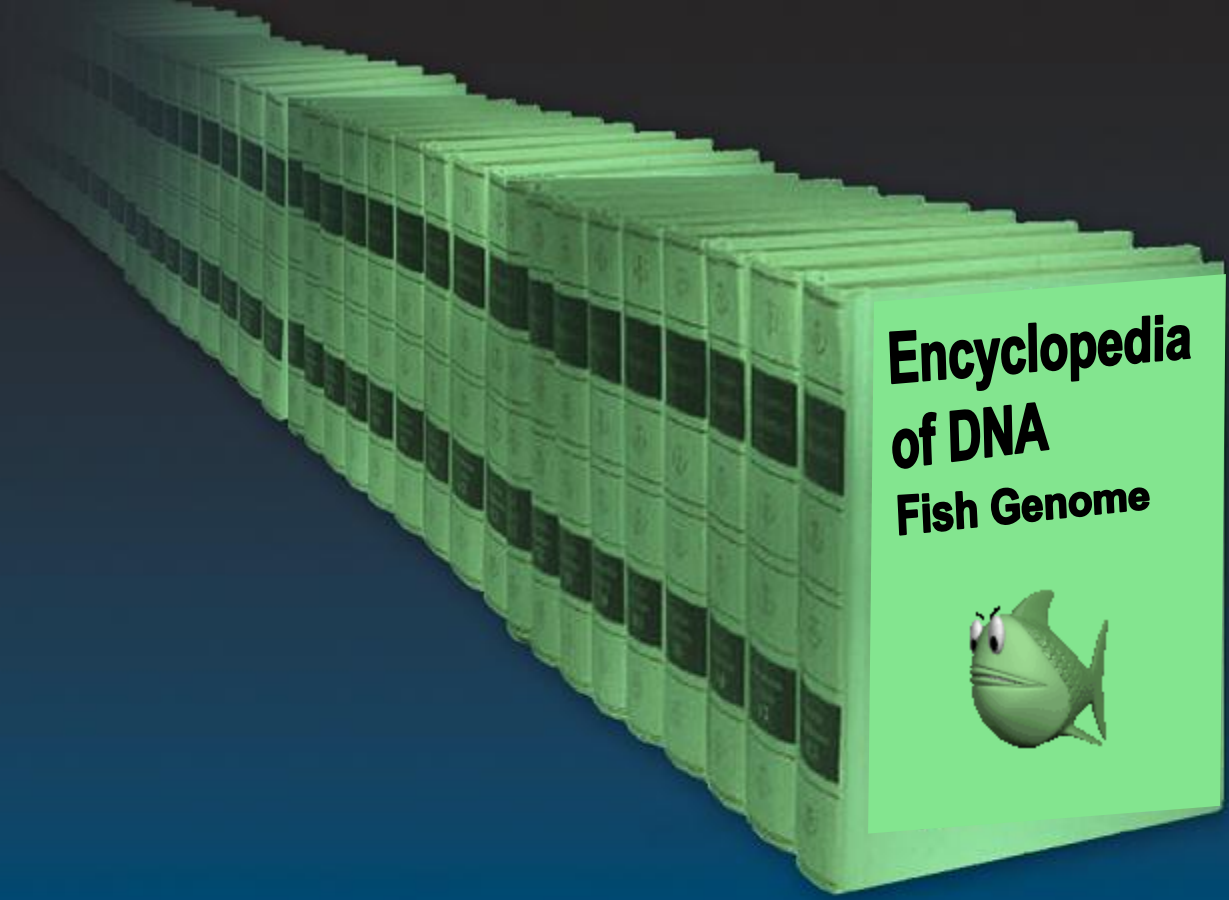 "Why not? Dead cow is dead cow regardless of its possible parentage."

Animal Biotechnology and Genomics Education

Shift gears to Genetic Engineering

What is DNA ?

GENOME

genome

cell

chromosomes

genes

DNA
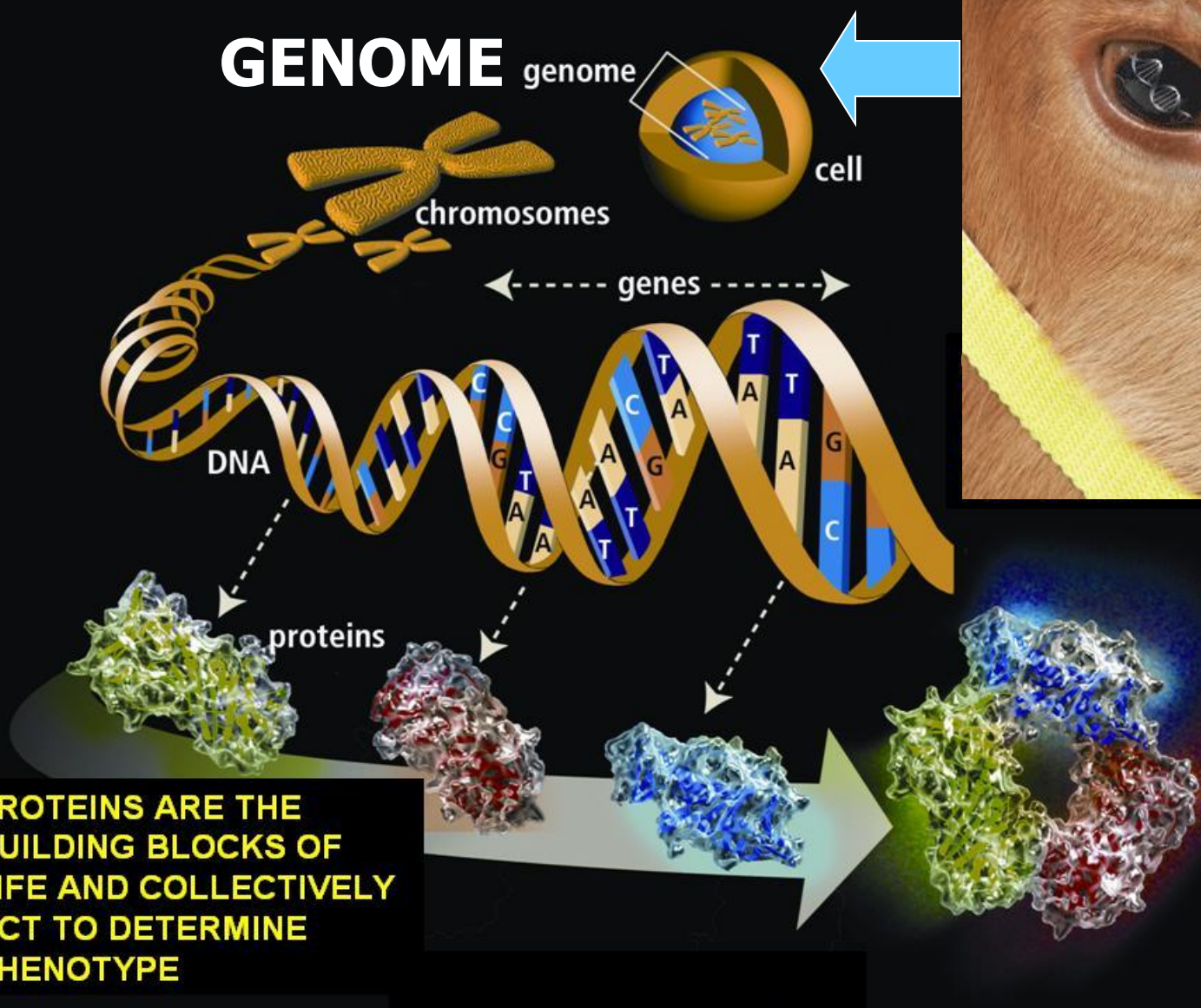
proteins

PROTEINS ARE THE BUILDING BLOCKS OF LIFE AND COLLECTIVELY ACT TO DETERMINE PHENOTYPE

Science

Livestock Decoded

AAAS

Encyclopedia
of DNA

Fish Genome

Protein 12,089
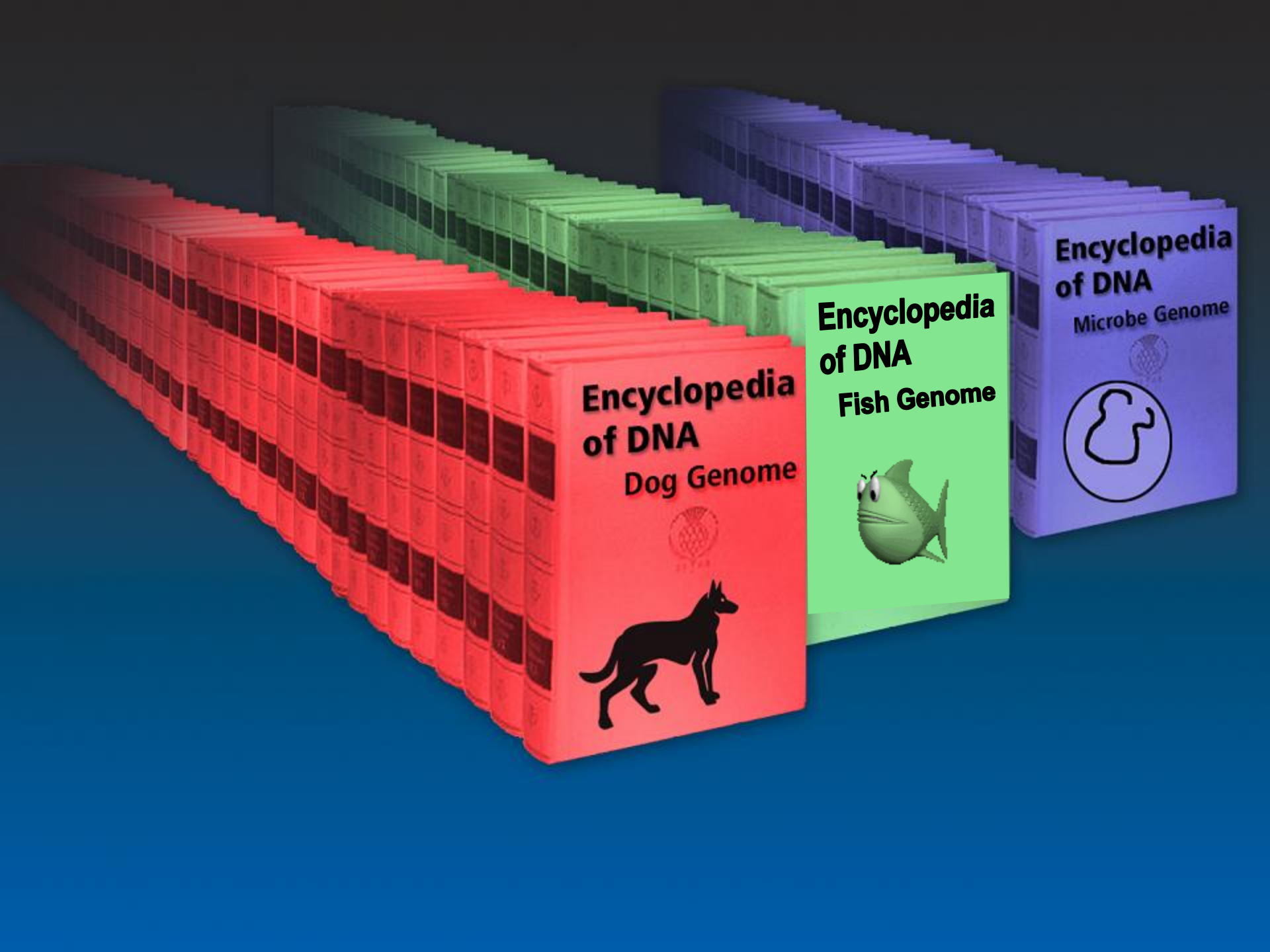
Encyclopedia of DNA — Dog Genome

Encyclopedia of DNA — Fish Genome

Encyclopedia of DNA — Microbe Genome

World Record 97 lb 4 oz. chinook salmon
(Les Anderson, Kenai River, AK 1985)
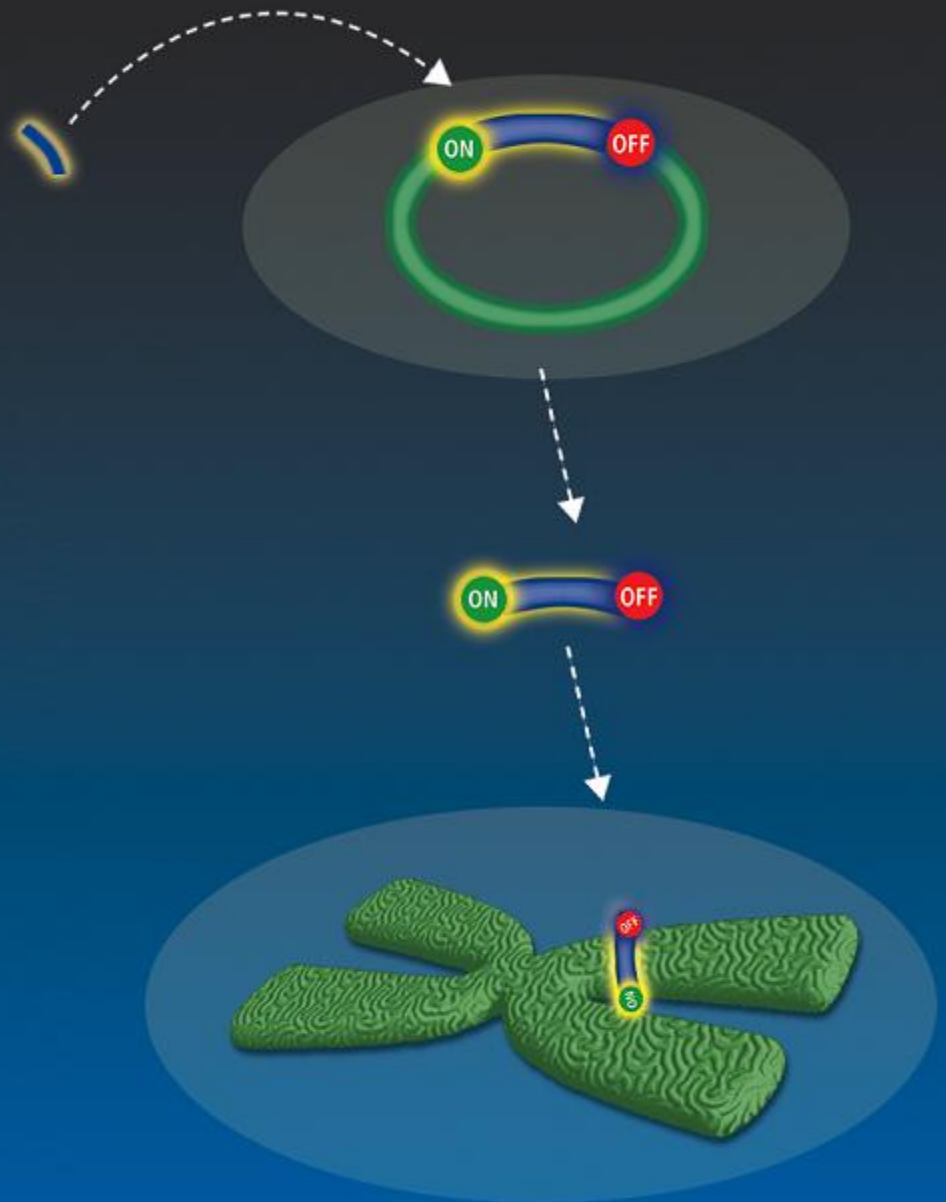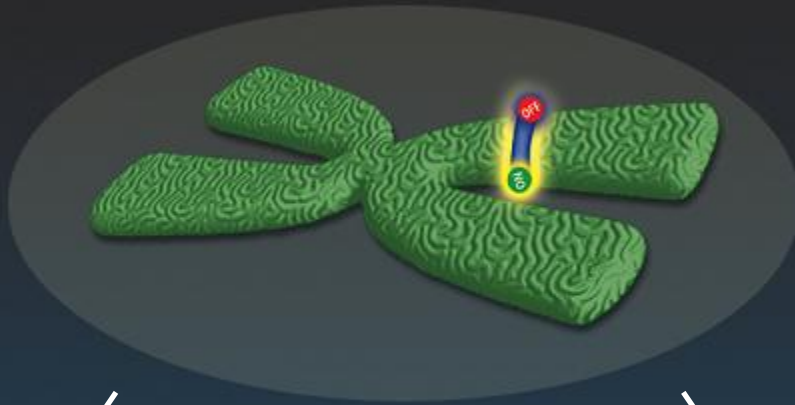
18 month old salmon

Enviropig™ (Low-phosphorus manure)
http://www.uoguelph.ca/enviropig/

World Business Newspaper   http://www.ft.com

Enviropig
Leaving pearls
behind swine
Page 21

Nature Biotechnology, 19, 741 - 745, (2001).
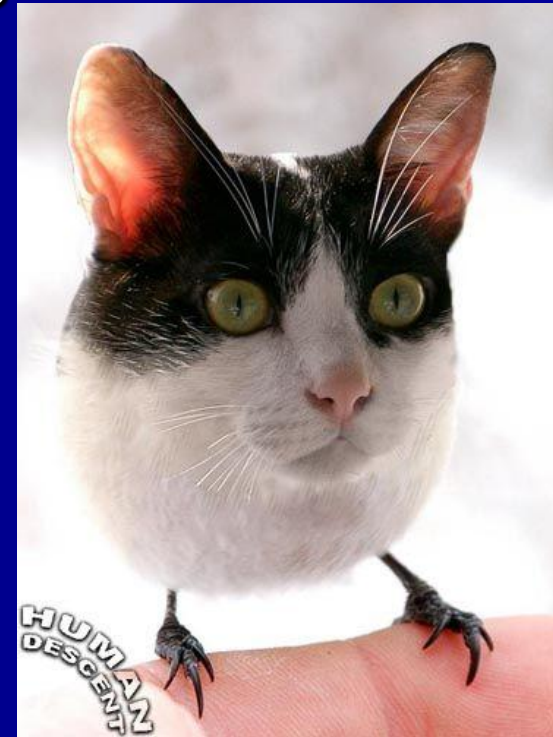
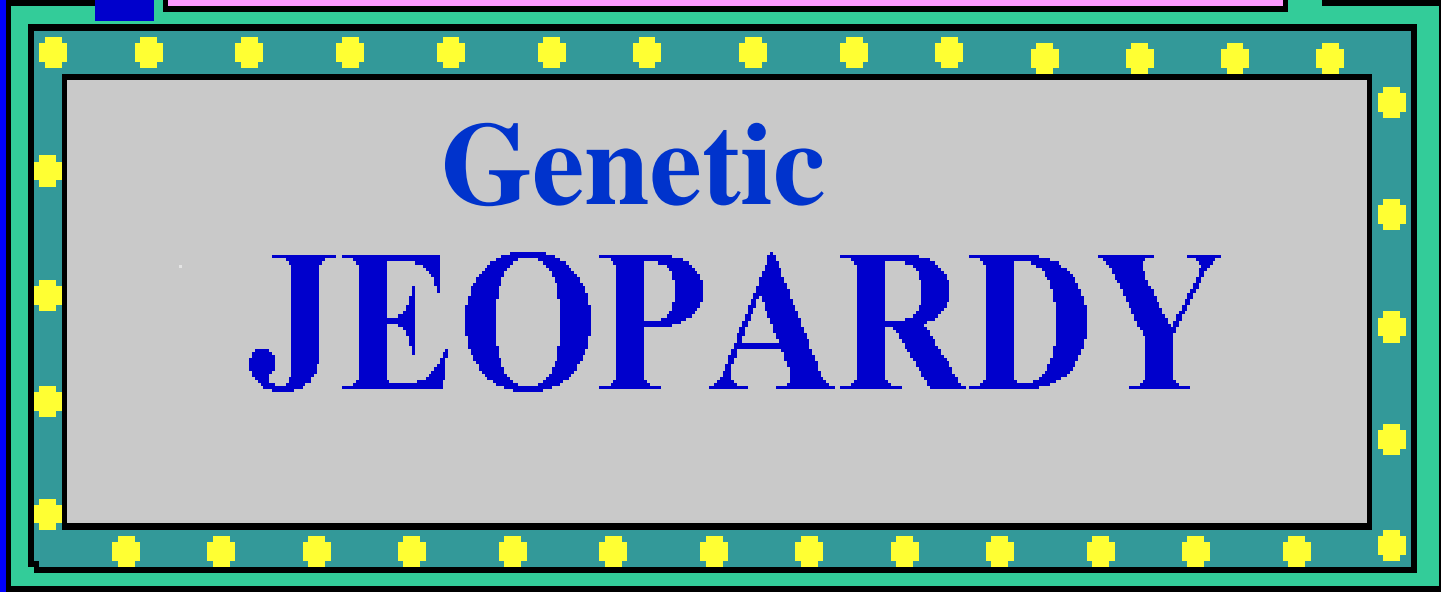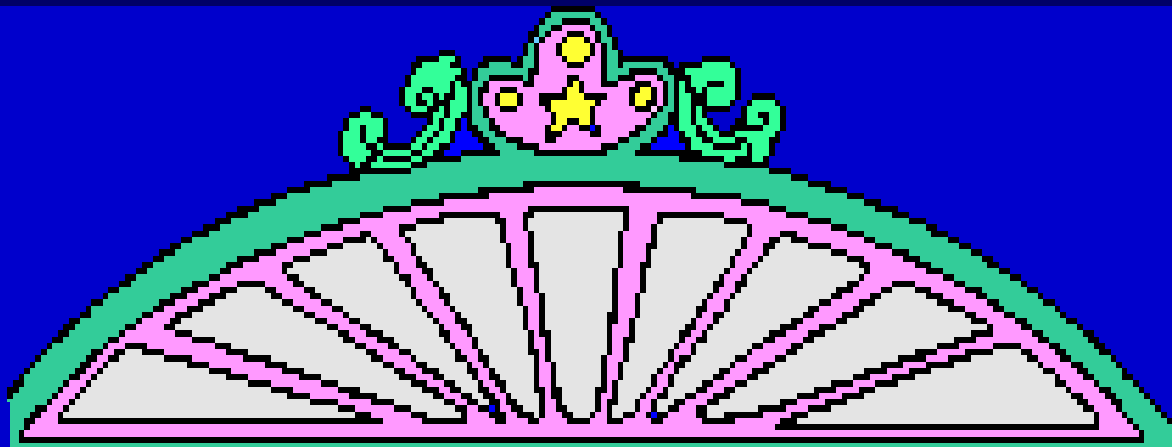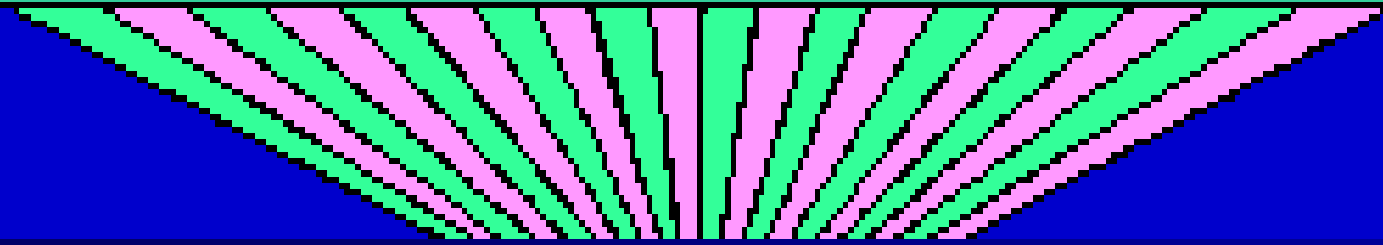# Genetically engineered fish and cloned cats – oh my...

Interfering with the integrity or *telos* of an animal

'will lead to abnormal outcomes'
'man is playing God'
'will cause economic disaster'

Genetic
JEOPARDY

GENETIC JEOPARDY

**FIVE
QUESTIONS**

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[20](#)

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It is the application of science and engineering to living organisms

What is biotechnology ?

It is the dairy cow

What is the black and white cow (Holstein breed) ?

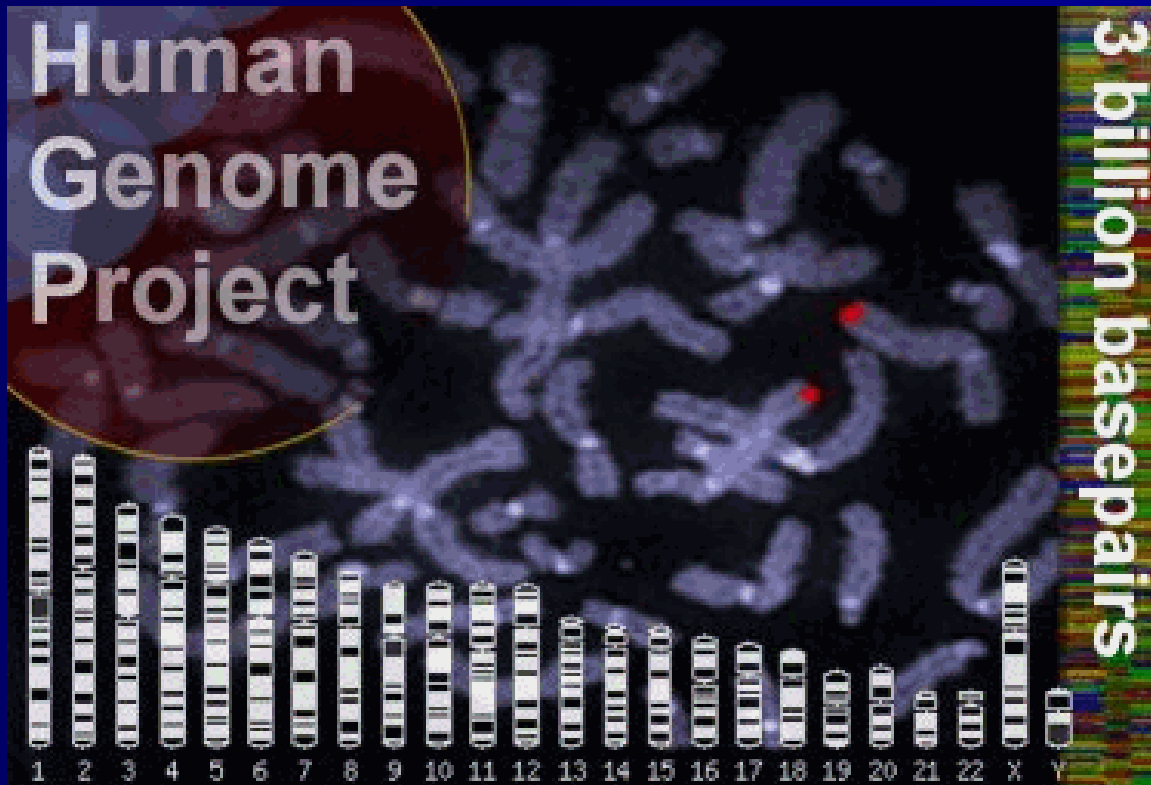**It is the process of making a genetically identical copy of an individual.**

What is cloning ?

It is the name for all of the DNA in each cell of an organism.

What is the genome ?

She was the first animal cloned from an adult cell.

Who was Dolly (the sheep) ?

FINAL JEOPARDY

It is a linear molecule that is shaped like a double helix and it is made up of pairs of nucleotides

FINAL JEOPARDY

What is DNA ?

B

Red
Orange
Yellow
Green
Wild Type

GMO'S TREAT OR TRICK?

HUMAN GROWTH HORMONE GENE

MT PROMOTER

Animal Biotechnology and Genomics Education