Pre-Reading Activities

A: Brainstorming
Do you know anything about mad cow disease? Work in groups of three and try to answers these questions:

* What diseases can you think of that can be passed from animals to people? What effects do these diseases have?
* What are some of the ways that people catch these diseases?
* Mad cow disease was seen in Britain in the 1980s. What does mad cow disease do to cows?
* How did doctors think people could catch it?

B: Vocabulary
Work in pairs. Match the following words with the meanings with which they are used in the article you are going to read. Use your dictionary if necessary.

<table>
<thead>
<tr>
<th>Words</th>
<th>Meanings</th>
</tr>
</thead>
<tbody>
<tr>
<td>genetic engineering</td>
<td>Parts of a cell usually made of DNA or RNA that controls the development of particular characteristics in living things.</td>
</tr>
<tr>
<td>infected</td>
<td>Being able to stop a disease.</td>
</tr>
<tr>
<td>gene</td>
<td>A disease is passed on from one person or animal to another.</td>
</tr>
<tr>
<td>resist</td>
<td>A science in which a gene or genes are changed in some way.</td>
</tr>
</tbody>
</table>

Reading Activities

A: Fill In The Gaps
The table below contains information from Part One of the article below. Fill the gaps by looking for the right information in the article.

<table>
<thead>
<tr>
<th>Nationality of Scientists:____________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Company doing research: __________________</td>
</tr>
<tr>
<td>Name of Publication reporting the research: __________________</td>
</tr>
<tr>
<td>Names of those involved: ___________________</td>
</tr>
<tr>
<td>Summary of research: They have produced cattle that do not have __________, proteins which are part of the nervous system and cause __________ in cattle and __________ in people.</td>
</tr>
</tbody>
</table>

Part One

Gene-engineered cattle resist mad cow disease: study

WASHINGTON, Mon Jan 1, 2007 (Reuters) - U.S. and Japanese scientists said on Sunday that they had used genetic engineering to produce cattle that resist mad cow disease (bovine spongiform encephalopathy or BSE).

They hope the cattle can be the source of herds that can provide dairy products, gelatin and other products free of the brain-debilitating disease.

Writing in the journal Nature Biotechnology... the researchers said the cattle do not have the nervous system prions, a type of protein, that cause BSE and other related diseases such as scrapie in sheep and Creutzfeldt-Jakob disease, known as CJD, in humans.

...Yoshimi Kuroiwa of Kirin Brewery Co. in Tokyo, Japan and colleagues made the cattle, known as knockouts because a specific gene has been "knocked" out of them...

"...The cows are now nearly 2 years old and are completely healthy," said James Robl of Hematech, a South Dakota subsidiary of Kirin.

Glossary: herd - group of animals, often cows, feeding and living together
B: Reading Cloze
Read Part Two of the article and use the words below to fill the gaps.

BSE swept through British herds in the 1980s and people began developing an odd, early... form of CJD called variant CJD or vCJD a few 1. later. CJD normally affects one in a 2. people globally, usually the elderly, as it has a long incubation period. There is no cure and it is always 3. As of November 2006, 200 vCJD 4. were reported worldwide, including 164 patients in Britain, 21 in France, 4 in the Republic of Ireland, 3 in the United States, 2 in the Netherlands and 1 each in Canada, Italy, Japan, Portugal, Saudi Arabia and Spain. The disease may have first started to 5. cattle when they were fed improperly processed remains of sheep, possibly 6. infected with scrapie. Although people are not known to have ever caught scrapie from eating sheep, BSE can be passed to humans. BSE occasionally occurs in cattle outside 7. although it is now rare.

Glossary: odd - strange, scrapie - a disease that affects the nervous system of sheep and goats and kills them

C: True or False
Use Parts One and Two of the article to decide whether these statements are true or false:

1. The researchers hope the genetically-engineered cows may be able to produce dairy-free products in the future.  
2. The herd of genetically-engineered cattle with no prions are now two years old.  
3. The Kirin herd of cows do not have a particular gene.  
4. Scrapie is a disease that affects sheep, goats and cows.  
5. CJD affects older people but vCJD affected younger people.  
6. People die if they get CJD.

D: Thinking Carefully
Use your own ideas and the article to answer these questions.

1. The researchers performed a kind of genetic engineering where they ‘knocked out’ a gene. How could this be used with other genes in the future?
2. Is vCJD a problem everywhere? Give reasons for your answer.
3. How may people have accidentally caused the BSE deaths in cows in Britain in the 1980s?

Post-Reading Activities
You may do one or more of these.

A: Language
The passive is often used in scientific reports when the focus is on what was done, not on who did it. Here are some sentences about BSE and research done on it.

Complete the sentences below using verbs in the active or passive voice and the simple present or simple past tense.

1. Scientists _______________ (think) that BSE is very infectious and persistent.
2. Research _______________ (carry out) by two scientists that _______________ (suggest) that infected animals other than cattle could also be linked to BSE.
3. Mice _______________ (inject) with hamster scrapie.
4. The scientists _______________ (discover) that the infected tissue from the mice _______________ (cause) scrapie in the hamsters.
5. Animals _______________ sometimes _______________ (feed) with feed containing meat from other animals.
6. In the 1980s in Britain some cows _______________ probably (feed) scrapie-infected sheep meat.

B: Work out a strategy
Work in pairs or small groups. Imagine you are the government of a country with animals infected with BSE, what would you do? In small groups make a list of the things you would do to try to prevent this disease from spreading.

C: Discussion
Work in pairs. What other genetic improvements can you think of that could be used in cows?
TEACHERS’ NOTES AND ANSWER KEY

Pre-Reading Activities
A: Brainstorming - Suggested Answers
* Answers could include avian or bird flu, salmonella, tuberculosis and rabies.
* Mad cow disease destroyed the brains of cows.
* People caught it from eating infected meat.
* The British Government worried that many people could have been infected after eating beef from British cows.

B: Vocabulary - Answers
genetic engineering: A science in which a gene or genes are changed in some way.
infected: A disease is passed on from one person or animal to another.
gene: Parts of a cell usually made of DNA or RNA that controls the development of particular characteristics in living things.
resist: Being able to stop a disease.

Reading Activities
A: Fill in the gaps - Answers
Nationality of Scientists: U.S. and Japanese
Name of Company doing research: Kirin Brewery Co.
Name of Publication reporting the research: Nature Biotechnology
Names of those involved: Yoshimi Kuroiwa, James Robl
Summary of Research: They have produced cattle that do not have prions, proteins which are part of the nervous system and cause BSE in cattle and Creutzfeldt-Jakob disease, known as CJD in people.

B: Reading Cloze - Answers
1. years, 2. million, 3. fatal, 4. patients, 5. infect, 6. sheep, 7. Britain.

C: True or False - Answers
1. F (they hope they can produce dairy products that do not have BSE or are BSE-free.), 2. T, 3. T, 4. F (it affects sheep and goats, not cows), 5. T, 6. T.

D: Thinking Carefully - Sample Answers
1. It could be used to remove other genes that carry diseases that affect people. People may also decide that some genes are not wanted and remove them.
2. Most cases of vCJD have been reported in Britain and BSE has mainly affected herds in Britain. However, a few sufferers have been found in other places so it can’t be said that it is only a problem in Britain.
3. By feeding cows with sheep meat that was infected with the disease, scrapie (i.e. the sheep may have had scrapie.)

Post-Reading Activities
A: Language - Answers
Scientists think (think) that BSE is very infectious and persistent.
Research was carried out (carry out) by two scientists that suggests (suggest) that infected animals other than cattle could also be linked to BSE.
Mice were injected (inject) with hamster scrapie.
The scientists discovered (discover) that the infected tissue from the mice caused (cause) scrapie in the hamsters.
Animals are sometimes fed (feed) with feed containing meat from other animals.
In the 1980s in Britain some cows were probably fed (feed) scrapie-infected sheep meat.