



BOVINE SPONGIFORM ENCEPHALOPATHY (BSE)

**A Lesson Plan
developed for
Teachers of Agriculture**

This lesson plan is designed to assist teachers in guiding the learning process in students as they learn more about Bovine Spongiform Encephalopathy (BSE). As with any lesson materials that are not prepared by the teacher who uses them, this lesson plan serves only as a guide. Teachers must adapt, supplement, and/or alter this suggested plan according to their expertise and the local needs, interests, and expected outcomes of the students who are in that classroom. Only in this way will the instruction given meet the needs of the students, school, community, and state in which the students live and the teacher works.

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BOVINE SPONGIFORM ENCEPHALOPATHY (BSE)

Lesson Title: The Basics of BSE

Terminal Objective: To assess the impact that BSE has had on the agricultural industry in the U.S.

Enabling Objectives: Given a lesson unit on BSE, students will be able to:

1. define BSE;
2. explain the history of the development of BSE;
3. explain the economic impact that BSE has had on the cattle industry;
4. describe how BSE is spread;
5. list the symptoms of BSE;
6. describe the causes of BSE;
7. explain the risk of BSE to the public;
8. describe the animal identification program;
9. describe the preventive measures that have been taken against BSE;
and
10. list examples of countries that have banned U.S. export of cattle or cattle products.

The teacher is encouraged to add his/her own enabling objectives that would take into account local situations or the need to add additional content information not provided within this lesson outline.

References, Equipment, Instructional Aids, and Related Web Sites

NOTE: *Teachers should use professional judgment in the selection and use of web sites. Web sites change over time and thus, the relevancy and accuracy of information contained on these sites will change as new information and research findings emerge in the area of BSE.*

http://www.aphis.usda.gov/publications/animal_health/content/printable_version/BSEbrochure12-2006.pdf

- USDA web site on current BSE issues

www.who.int/mediacentre/factsheets/fs113/en/ - Fact sheet on BSE

<http://www.cfsan.fda.gov/~comm/bsefaq.html> - Food and Drug Administration Web Site on BSE

http://w3.aces.uiuc.edu/AnSci/BSE/Index_BSE_Information_at_UIUC_Left.htm - BSE web site at the University of Illinois at Urbana, Champaign

<http://www.cdc.gov/ncidod/dvrd/bse/> - BSE and CJD information and resources at the Center for Disease Control

<http://www.fda.gov/oc/opacom/hottopics/bse.html> - FDA site about BSE

<http://www.who.int/csr/disease/bse/en> - World Health Organization site on BSE

<http://www.inspection.gc.ca/english/anima/heasan/disemala/bseesb/bseesbind.exe.shtml> - Canadian site on BSE

Nunes, Keith. (2004). "48 Hours: The Countdown to a National I.D. System is On," **Meat & Poultry**, Vol. 50, No. 2, February 2004, pp 28-31.

Kay, Steve. (2004). "Sticker Shock," **Meat & Poultry**, Vol. 50, No. 4, April 2004, pp 14-20.

Henderson, Jason. (2003). "FAQs about Mad Cow Disease and Its Impact," **The Main Street Economist**, Center for the Study of Rural America, Federal Reserve Bank of Kansas City, www.kc.frb.org, December 2003.

Lesson Plan Color Code

GREEN – Suggestions to the teacher of teaching approaches, teaching techniques, instructional aids, or other ideas that the teacher might find helpful in teaching this lesson. Space is also adequate for teacher notes.

BLUE – Web sites that provide information, knowledge, or background that relate to the Enabling Objectives for the lesson. In some cases, the teacher can use the web sites to prepare for the lesson, in other cases; the students can go to the web sites for basic information or further reading.

RED – Questions a teacher can pose to the students or they can be used to guide the teaching process. Question numbers relate back to the number of the Enabling Objectives found at the beginning of the lesson.

Introduction: The following ideas are possible suggestions for introducing this lesson topic.

1. Did your family or do you know somebody who stopped eating beef products during the BSE outbreak? What did your family or the people give as reasons for stopping to eat beef?
2. Invite a local veterinarian to class to talk about BSE or other recent animal diseases that are currently in the news.
3. With all the modern technology and advances in animal and human health today, how could something like BSE occur?

TEACHING OUTLINE

Methods/hints/aids
Teacher notes

Technical/subject matter content

1. What is BSE?

<http://www.cfsan.fda.gov/~comm/bsefaq.html>

<http://www.who.int/csr/disease/bse/en/>

<http://www.inspection.gc.ca/english/anima/heasan/disemala/bseesb/bseesbindexe.shtml>

BSE stands for Bovine Spongiform Encephalopathy

Common name – Mad Cow Disease

A slowly progressive, degenerative, fatal disease affecting the **central nervous system** of **adult** cattle

2a. Is BSE a recent disease that has developed?

The **first confirmed case** in the U.S. was **December 2003** in the State of Washington. The animal involved was a dairy cow that had been purchased in Canada.

Earlier cases have been reported in other countries, especially countries in **Europe**

BSE was first reported in cattle in the **United Kingdom in 1986**, believed to have originated from infected feed made from sheep meat and bone containing **scrapie**

Assign students to find a description of the disease Scrapie

Scrapie is a fatal, degenerative nervous disease of **sheep and goats**

2b. What countries have reported cases of BSE?

Assign students to go to the following website and report back to class on what countries are listed

<http://www.cfsan.fda.gov/~comm/bsefaq.html>

3a. What impact has BSE had on the cattle industry?

Assign students to read the following article.

Kay, Steve. (2004). "Sticker Shock," Meat & Poultry, Vol. 50, No. 4, April 2004, pp 14-20.

Placing an exact figure on the dollar impact is **very complicated**

3b. Where has the economic impact been felt?

Impact can generally be summarized into **five areas**. These are:

actual losses to the **beef processors** (those who slaughter live cattle and produce wholesale beef)

impact on "below-the-line" costs, such as **lower operating efficiency** and **higher production costs** due to new government regulations regarding removal of specified risk materials (SRM)

actual and paper losses to the **beef producers** (those who breed cows and raise feeder calves to place in feedlots)

losses to **cattle feeders** (those who produce cattle for slaughter by feeding feeder calves in feedlots)

retailers (grocery stores and restaurants who further prepare beef for consumers)

3c. What are some examples that reflect the economic impact on the beef industry?

Examples contributing to an economic impact are:

declining cattle and wholesale **prices**
export ban on U.S. beef and beef variety meats

loss of value of **downer** cattle (an animal that cannot move on its own)

cost of removal of specified risk materials (SRM)

packing plants **layoffs** of workers
reduced working hours of beef processor employees
reduced economic business to companies supplying the processing industry or handling allied products

Ask students if they know of examples in the local community and place on chalkboard

3d. What are the dollar figures reflecting the economic impact?

In **2003**, the U.S. **exported** a **\$3.862 billion** worth of beef and beef variety meats. (1.276 million Metric tones)

Export bans shut off export business that averages **\$74 million** and 54 million pounds per week

Export bans reduces the need for **65,000** fed cattle per week

Fed cattle **prices dropped** from **\$91-92** per cwt. **before** the December 2003 BSE outbreak to **\$74-75** per cwt **after** the outbreak

Loss of **downer** cattle, including dairy cattle, for **2004** projected to be **\$50 million**

Down spiral in live cattle and feeder cattle **futures** contracts

Beef **production** estimated to be **down 12** percent

80,000 jobs in the packing and processing plants are being impacted

120,000 jobs in allied industries are being impacted

Estimated that BSE is **costing** the U.S. beef industry and overall economy anywhere from **\$100-300 million per week**

Estimated **total impact** since December 2003 is **\$14 billion** off the value of the national cattle herd

4. How does BSE spread?

No evidence that it spreads with contact between cattle or contact between cattle and other species. It is considered a **non-communicable** disease.

Some evidence of maternal transmission

Infection occurs when cattle **eat feed** that has been **infected** with a BSE agent. The cause has been linked to feed that contains animal parts (**central nervous tissues used as a mammalian protein**) from **infected** animals.

5. What are the symptoms of BSE?

http://w3.aces.uiuc.edu/AnSci/BSE/Index_BSE_Information_at_UIUC_Left.htm

Students can be assigned to go to this web site to compile a list of symptoms

Changes in animal temperament

Nervousness
Aggressive behavior

Abnormal posture

In coordination

Difficulty in standing

Decreased milk production

Loss of body weight, even with continued appetite

Abnormally stilted gait

High stepping walk

Itching

Anorexia

Excessive licking

Death

6. What causes BSE?

Exact cause is still **unknown**

Generally accepted that it is based in a type of aberrant (**abnormal**) **protein** called “**prions**”

These abnormal proteins are **found** in the **small intestines and tonsils**. **Also** in the **central nervous tissues** such as the **brain** and **spinal cord**.

7a. What is the risk to the public?

Risk to public is **extremely** low

A **similar disease** has been found in humans called **Creutzfeldt-Jakob Disease (CJD)**

Assign students to review the following web site to learn more about this human disease

<http://www.cdc.gov/ncidod/dvrd/bse/>

BSE has **not** been found in **muscle** meat

Milk and milk products have **not** been found to transmit BSE, even when the milk is from a cow with BSE or milk products are made from the milk

7b. Can other animals be infected with similar diseases?

Sheep and goats – **Scrapie**

Deer and elk – **Chronic Wasting Disease (CWD)**

8a. What is the animal identification program?

<http://usaip.info/faq.htm>

Nunes, Keith. (2004). "48 Hours: The Countdown to a National I.D. System is On," **Meat & Poultry**, Vol. 50, No. 2, February 2004, pp. 28-31.

The **U.S. Animal Identification Plan (USAIP)** defines the standards and framework for implementing and maintaining a phased-in **national** animal identification system for the United States

The **goal** is to trace the history of any animal within **48 hours**

Check to see if any student or local farmer/rancher has implemented this program. If so ask them to visit the class to discuss the program.

8b. Why have the USAIP?

It is needed to help **protect** American animal agriculture

It **identifies** all **food animals and livestock**, will enhance disease preparedness by allowing the U.S. to identify any animals exposed to disease, and will facilitate stopping the spread of that disease

In addition, it will provide **benefits** to industry in terms of market access and consumer demand

This is a working system that allows for **trace backs** to all **premises** that had direct contact with an animal with a foreign animal disease within **48 hours of discovery** and will reduce the financial and social impacts of such a disease

8c. What species are included in this plan?

Currently, **beef, dairy, swine, and sheep**. It is anticipated that **equine, aquaculture, poultry, goats, camelids, cervids** and any other species deemed necessary to protect animal agriculture will be included in the future.

8d. When will this program start?

All states are to have a premises identification system (identification of a farm/ranch) initiated by **July, 2004**

Unique, individual or group/lot numbers be available for issuance by the **middle of 2004**

All **cattle, swine, and small ruminants** possess individual or group/lot identification for interstate movement by **July 2005**

All animals of the **remaining** species/industries identified above are in similar compliance by **July 2006**

These standards will apply to all animals **in commerce** within the represented industries **regardless** of their intended use as seed stock, commercial, pets or other personal uses

Assign students to go to their State Agriculture Department or State Veterinarian Web Sites to learn of the status of the animal identification system for their State

8e. Where can a person obtain a premise ID?

The **administration and maintenance** of premises ID lies with each state's **Department of Agriculture**

State departments will **use** a national mechanism to obtain a unique national premises ID, and will record additional information such as type of premises, contact name, address, and phone number to contact the person in charge of a premises

Key pieces of information will be sent to the **national premises database** that can be used in the case of a disease trace-back

NOTE: The teacher could carry out the following assignment or assign students to contact their State Department of Agriculture to obtain the materials or procedures that one would follow to implement an animal identification system on a local farm/ranch. This procedure could then be taught to answer the following question, 8f.

8f. How can a local farmer/rancher develop an animal identification system for his/her business?

9. What measures have been taken to protect the public and livestock against

<http://www.cfsan.fda.gov/~comm/bsefaq.html>

The following regulations have been **issued** by USDA

A **ban** on use of live, but **non-ambulatory** disabled cattle (downers) from **entering** the human food supply (these are animals that cannot walk)

A **1997 FDA ban** on use of **organs** from cattle older than **30 months** for use as animal feed in which infected prions may occur. **Specific parts** not allowed are:

- skull
- brain
- trigeminal ganglia

eyes
vertebral column
spinal column
dorsal root ganglia

A **ban** on use of animal parts for **human consumption** regardless of age:

tonsils
small intestine

Restrictions on techniques to **mechanically** remove meat from bones

Meat from **tested** animals will **not** be **certified** as USDA-inspected until test results have shown the meat to be **negative** for BSE

Development of the **USAIP** Program to be able to **trace diseased animals** to the source within **48 hours**

Since **1989**, **live** ruminants (cattle, sheep, and goats) and most products from these animals have been **banned** by USDA from **countries** known to have BSE

FDA **prevents** entry of **cosmetics, food, food ingredients, drugs, vaccines, and dietary supplement ingredients** containing high risk bovine materials from animals originating in **BSE countries**

Assign students to review the following web site to learn more about the U.S surveillance program underway

The **Animal and Plant Health Inspection Service (APHIS)** of the USDA has a **surveillance** program in place in the United States to ensure **detection** and swift **response** in the event that an introduction of BSE was to occur

This surveillance program incorporates both the **location of imports** from **countries** known to have BSE and targeted active and passive surveillance for either **BSE** or other form of **transmissible spongiform encephalopathies (TSE)** in cattle

10. What countries have placed a trade ban on U.S cattle or cattle products?

Assign students to go to the following website and report back to class on the countries and what the restrictions are

Summary

1. The teacher is encouraged to summarize at the end of each day's class.
2. Highlight the major points made on web sites where students can find the latest information on BSE.

Plans for Application

1. Contact the State Department of Agriculture to obtain the latest information on plans to implement the Animal Identification Program.
2. Students who come from farms/ranches that might be affected by BSE could develop plans to protect their cattle.
3. Information on how to sign up for or implement an animal identification program could be obtained from their State Department of Agriculture and implemented on a local farm as a pilot or model program.
4. If a local farmer/rancher has implemented an animal identification program, students could be taken on a field trip to observe how the program was implemented and works. Or the farmer/rancher could be invited to class as a guest speaker.
5. Invite a local veterinarian to class or visit a local meat processing plant to learn exactly what parts of an animal are banned for use as animal feed.

Evaluation

Using the questions related to each enabling objective, the teacher can develop quiz or exam questions that would focus on the major points of the lesson.

