MEMO/00/122

Brussels, 19 December 2000

Frequently asked questions about BSE-tests

What will a BSE-test look for?

The commonly accepted cause of BSE is a misshaped prion protein (PrPres). This misshaped protein causes other normal proteins to become misshaped. These proteins clump together to form sheets. There are other theories of the cause of BSE and some variations on the above theory. The presence of PrPres is regarded as a marker for the disease.

BSE tests will determine if a detectable level of PrPres (either the cause of BSE or a marker for the disease) is present in the tissue examined.

How many tests have been approved by the European Commission?

To date, the European Commission has approved three rapid tests developed by:

- CEA (name of test: Biorad)
- Prionics AG (name of test: Prionic check)
- Enfer Technology Ltd.(Enfer test system)

Five further rapid tests are currently under examination.

How do the tests operate in practice?

All three tests operate by detecting the infectious agent or marker PrPres in the central nervous system. Following slaughter of the animal a sample of brain or spinal cord is taken from the animal using a special tool. This tissue is taken to the laboratory and tested for the presence of PrPres. Rapid tests are quick and reliable, and allow large numbers of samples to be tested.

What other methods are used to diagnose BSE?

Other laboratory techniques used to diagnose BSE include histopathological examination (detection of spongiform encephalopathy), examination of BSE fibrils (equivalent to scrapie associated fibrils), examination by immunohistochemistry.

For what purpose can the tests be used?

Tests may be used for surveillance and also to provide additional protection for the consumer.

1. Surveillance

Tests can be used to determine if BSE exists in a population and to obtain an indication of its prevalence. Used over time these can be used to monitor changes in the level of the disease. This type of surveillance can be carried out by testing risk groups of animals, especially cows which have died on farms or cows presented for emergency slaughter. If BSE occurs, it is more likely to be found in this population so the sampling is more effective. Actively searching for the disease in this manner is more likely to detect it in a population (if it exists there) than passive monitoring, i.e. waiting for farmers to report suspicious signs.

The European Union will apply such a testing programme amongst its "at-risk" population on animals over 30 months from 1.1.2001 onwards.

2. Additional Health protection

BSE is a relatively rare disease. However, routine testing of animals prior to slaughter may detect animals presented for slaughter which may have unnoticed signs of BSE and also animals with the disease which are not yet showing signs. The identification and removal of these animals will be an additional protection for the consumer. However, the prime method of consumer protection is the removal of specified risk material like brain or spinal cord from every animal slaughtered. These tissues harbour almost all infectivity if any present. Removal of specific risk materials is obligatory in the EU since 1.10.2000.

PrPres is always found in brain and central nervous tissue in animals with clinical signs of the disease and in animals in the months before they develop the disease. Its presence in cattle appears to parallel the development of infectivity.

The EU will apply such a testing programme on all bovine animals over 30 months of age from 1.7.2001 onwards. Until then, all animals over 30 months which cannot be tested will need to be destroyed.

How did the European Commission evaluate BSE tests?

Test developers who had test in the final stages of development were asked to submit them for possible evaluation. In all ten applications were received. Following review by an expert group, the four most promising tests were evaluated as follows:

Under supervision laboratories were asked to test 1,400 samples taken from healthy and diseased animals. The samples were coded so that the laboratory staff did not know which type of animals they were from (i.e. they were tested blind). In fact the 1400 samples were made up of 1064 samples from 1000 different healthy animals and 336 samples from 300 animals with confirmed BSE.

The evaluation was carried out in accordance with the guidelines of the International Office of Epizootics (OIE).

The detection limits of the tests were also assessed by testing BSE positive brains serially diluted in negative brain.

How were you sure that the positive animals had BSE and that the negative animals were healthy?

In evaluating a test it is extremely important to be sure that the samples from the diseased animals really had BSE and that the samples from the healthy animals were really not infected. Otherwise the evaluation is not accurate. In this case the samples from the diseased animals were obtained from cows from the UK which had shown signs of BSE and in which the disease had been confirmed by microscopic examination of the brain. The samples from the healthy animals were obtained from New Zealand as this is the country most recognised as free from BSE. They were healthy cows and their brains were also examined microscopically.

What were the results of the evaluation?

Three of the four examined tests managed to identify every single one of the samples correctly. The fourth test correctly identified 70% of the disease samples and 90% of the healthy samples. The report of the evaluation is on the Commissions web site at:

http://europa.eu.int/comm/food/fs/bse/bse12_en.html

How do these results compare with tests for other diseases?

These results compare very well with test for other diseases. For example tests for other animal diseases such as tuberculosis or brucellosis are less accurate that these even in the very late stages of these diseases.

What can the test do early in the infection?

No method will detect BSE early in the infection. BSE has an average incubation period of 4-6 years. Therefore the EU testing programmes are targeted at animals over 30 months. The PrPres has not been detected in bovine brain or other nervous tissue very early in the disease and infectivity has not been shown either. In experimental infection where very high doses were administered, infectivity has been found in the ileum, part of the intestine. This has not been detected in natural infections.

What does the dilution series tell us?

In the dilution series, brain tissue from BSE infected cows of a known infectivity titre was serially diluted in healthy brain tissue. This was done to obtain a proxy to early infection when the levels of PrPres in the brain are much less.

This is a useful proxy but must be interpreted with care as certain test technologies may affect a dilution series differently than material from pre-clinical cows.

Why not use tissue from pre-clinical cows?

Such tissue is not available for routine use. This tissue can only be produced by experimentally infecting cows and then slaughtering them later before they develop symptoms.

Have the tests detected pre-clinical animals?

All three approved tests have identified pre-clinical animals. These are animals not yet showing clinical symptoms. The CEA/Biorad detected pre-clinical animals in an experiment. The Enfer test has detected several pre-clinical animals, particularly from herds which have been slaughtered because one case of BSE has been detected. The Prionics test has detected pre-clinical animals from herds depopulated because of BSE and also in animals at normal slaughter in Switzerland and now in Germany. The two cases identified in Germany were in normal animals presented for slaughter.

In the case of animals detected at slaughter, we can be confident that no obvious signs of BSE were present but we cannot know how advanced the disease was.

Several cases of BSE have also been identified by the tests in animals presented for emergency slaughter. These are not pre-clinical animals. They showed some disease signs but these signs had not been treated as suspicious for BSE.

How much have tests been used to date?

Tests have been used routinely in Switzerland for the past three years. They have also been used in Ireland in testing animals from depopulated herds where BSE has been identified. In recent months they have been used in other Member States, particularly France and have resulted in an increase in detection of the disease. The first cases identified in Germany were detected as a result of a test.

How many cases do you expect to find?

As said earlier, BSE is a relatively rare disease. The rate of detection in the general population (i.e. normal slaughter cows) would be expected to be many times less that in the 'at-risk' groups of animals that have died on farm or that re subjected to slaughter because of health problems. In Switzerland the ratio was calculated to be about one case in the normal population for 186 cases in the 'at-risk' population.

What parameters may be used to select a test?

The three tests use different methodologies which will suit different laboratories. Factors to take into account include the current expertise in the laboratory, familiarity with the test technology, degree of automation desired etc.

How much do the tests cost?

Member States purchase following competitive tenders. The cost will depend on this and also factors such as size of order, whether items such as training are included etc. Tests cost about €15-€20 at present, not including laboratory work and items such as the transport of samples etc.