



Brain Removal in Sheep and Cattle for TSE Surveillance

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WARNING:

Some photos contained in this Agriculture Note could offend some readers. However, this graphical representation is necessary to allow for the procedure described below to be accurately performed by the appropriate personnel.

This Agriculture Note describes longitudinal craniotomy – a simple method of brain removal in sheep and cattle for TSE surveillance.

Laboratory examination of the brain for transmissible spongiform encephalopathies (TSEs) requires its removal from the skull (cranium), whole and intact, and without damage to the brainstem.

Objectives

Longitudinal craniotomy involves splitting the skull (but not the brain) ventrally and dorsally along its longitudinal axis with an axe (Figure 1). The axe can be hit with a small sledge hammer for greater control and safety. Eye protection should be worn. The two halves can be levered open from the front end to expose the intact brain. This method requires practice. It has the advantage of exposing the pituitary gland. The technique is similar for sheep and cattle.

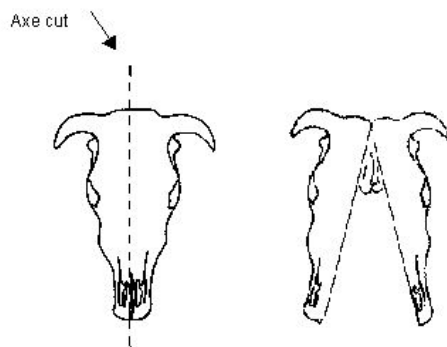


Figure 1

The procedure can be performed quickly, simply and safely under field conditions with minimal equipment. With practice the brain can be removed in less than one minute.

Method

Figures 2 to 10 illustrate the removal of a sheep brain. The equipment required includes an axe, small sledge hammer, boning knife, disposable rubber gloves and safety glasses.

Removing the head

Bend the head back to extend the neck and commence severing the ventral neck at the level of the atlanto-occipital joint. When the cervical spinal cord is exposed within this joint, sever the cord at the most caudally accessible site to leave 2 to 3 cm of spinal cord attached to the brain stem.

Preparing the head

Skin the ventral head and remove the tongue and soft tissues of the throat so as to expose the hard palate and ventral cranium (Figure 2).



Figure 2

Turn the head over and cut the skin on the top of the head along the midline (Figure 3).



Figure 3

Extend the cut deeply into the soft cartilage of the nose in the midline to split the nose (Figure 4).



Figure 4

Using the axe

With an axe, crack the dorsal skull along the length of the midline where the skin cut has been made (Figure 5). The axe can be hit with a small sledgehammer for better control.



Figure 5

The aim is to crack the bone (cranium) surrounding the brain without damaging the brain but fully cut through the depth of the nose and jaw.

Turn the head over. Using an axe, split the front of the bottom jaw, crack the cranium along the midline and split the hard palate and nose to full depth (Figure 6).



Figure 6

Levering the head open

With a knife, cut any soft tissue attachments that might prevent the two halves of the head being levered apart (using the two halves of the split nose).



Figure 7

Grab the two halves of the split nose and slowly prise and pull them apart (Figures 7, 8). More bone cracking will be required if the head won't come apart easily. If the cranium has been cracked sufficiently, the whole head can be levered open and the brain and pituitary gland exposed.



Figure 8

A boning knife (or scissors) is used to cut the nerve roots and dura mater as the brain is exposed and removed (Figure 9). The brain can be removed whole and intact. The hemisected pituitary gland is exposed at the base of the brain (Figure 10). It is easily removed if required.



Figure 9

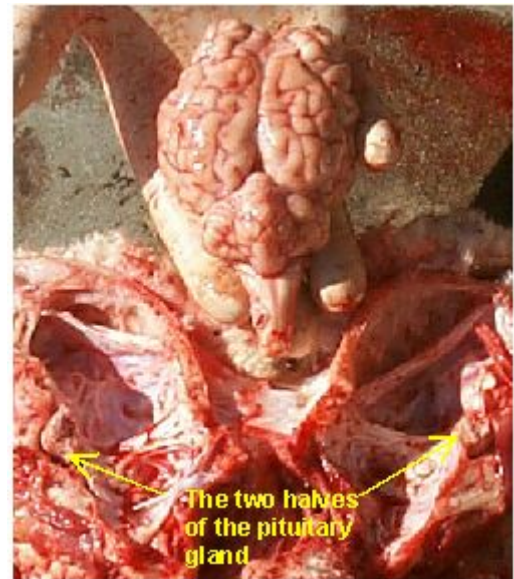


Figure 10

Common mistakes

Cracking (cutting) too deeply into the bone around the brain, particularly the bone protecting the ventral brain, can damage the brain stem.

Insufficient 'cracking' of the bones surrounding the brain, particularly the ventral cranium, can make it difficult to lever the cranium apart. One side of the nose breaks.

Levering the head apart too quickly can tear the brain.

The previous version of this note was published in December 2005.

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