**Usefulness of pathological examinations of the central nervous system for monitoring and controlling perinatal lamb mortality**

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**Supplementary materials**

Supplementary Material S1

*Sites of histological assessments*

One tissue section at the optic chiasma was examined to get general impressions of the distension of blood vessels. Haemorrhage was sought in the meninges of the median fissure, dorsal surface, and sulci of the parietal cortex and cortex. The neurones of the cerebral cortex were examined for evidence of iscaemic necrosis, and the lateral ventricle and its choroid plexus particularly for evidence of haemorrhage or periventricular leukomalacia. The ventral meninges and parenchyma of the hypothalamus and thalamus were examined, particularly seeking ischaemic neuronal necrosis in the basal ganglia and corpus striatum. Another section at the optic chiasma was similarly examined. The two sections of occipital cortex, hippocampus and midbrain were also examined, with particular examination of the pyramidal cells in all parts of the hippocampal formation, and to neurones in grey matter of the midbrain. The dorsal and ventral meninges and sulci of the cerebellum were then examined. The cerebellar paranchyma was examined for haemorrhage and neuronal necrosis, particularly the Purkinge cells. The meninges and parenchyma of cerebellar peduncles, rostral and abrostral medulla and spinal cord were then examined for haemorrhage and neuronal necrosis.

Supplementary Material S2

*Site and interpretation of haemorrhage*

Loose, extra-vascular infiltration by erythrocytes was typically found in the leptomeninges, and were deemed to represent either diapedesis from local, thin-walled blood vessels whilst the animal was moribund and/or shortly after its death, or diffusion in the sub-arachnoid space of cells from a nearby site of haemorrhage. In the leptomeninges of the more abrostral parts of the brain, they might also have represented contamination of the cerebrospinal fluid in that space by blood from vessels that were transected when the cadaver was decapitated. Densely clustered, extravasated cells were deemed to represent local haemorrhage. Almost all such extravasations in the parenchyma of the brain seemed well confined to perivascular spaces, with little if any dissection into the adjacent neuropil. Similar haemorrhage in the grey matter of the cervical part of the spinal cord often did dissect into the immediately adjacent neuropil.

Supplementary Material S3

*Inter and intra-observer agreement coefficients for photo scores*

Mathematically, Gwet’s AC1 coefficient is defined as:

$$AC\_{1}=\frac{P\_{a}-P\_{e}}{1-P\_{e}}$$

where Pa is the original percent agreement and Pe is the percent chance agreement. The quadratic weighting scheme adopted in this study was: an exact match case bears 100% weight; matching within one category differences bears 94.75% weight; matching within two category differences bears 75% weight; matching within three category differences bears 43.75% weight; matching within four category differences bears zero weight. The weighted agreement coefficients are considered as a superior measure because it is reasonable for researchers to consider the less serious disagreements as partial agreements, especially for ordinal data ([Gwet, 2014](#_ENREF_12)).

**Supplementary Table S1** *Percentage of photos (%) of lamb brains given the same score, or one score higher or lower (+/- 1 score) for the initial and subsequent assessment, for observers 1 and 2.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Score | Observer 1Same score (%)1 | Observer1+/- 1 score (%) | Observer 2Same score (%)1 | Observer 2+/- 1 score (%) |
| 1 | 75 (8) | 25 | 0 (2) | 100 |
| 2 | 48 (44) | 50 | 67 (12) | 25 |
| 3 | 65 (17) | 35 | 79 (28) | 21 |
| 4 | - (0) | - | 55 (20) | 45 |
| 5 | 50 (2) | 50 | 67 (9) | 22 |

1 The number of photos for each initial score for each operator is indicated in brackets.

**Supplementary Table S2** *Number of photos of lamb brains given the same or different scores between observers 1 and 2 for the initial and subsequent assessments combined*

|  |  |
| --- | --- |
| Score by observer 1  | Score by observer 2  |
|  | 1 | 2 | 3 | 4 | 5 |
| 1 | 2 | 8 | 4 |  |  |
| 2 | 1 | 13 | 36 | 17 |  |
| 3 |  | 4 | 18 | 17 | 12 |
| 4 |  |  |  | 2 | 4 |
| 5 |  |  |  |  | 4 |