Pathogenesis of Polioencephalomalacia (PEM)

Exogenous - plants: bracken fern, field horse tail, Nardoo fern and other semi-aquatic spp) Thiaminases
High sulphur intake- ammonium sulphate (urinary acidifier), Brassica crops, molasses, fertilizers and water source
Endogenous thiaminases

Deficiency leads to reduced activity of transketolase (rate limiting enzyme in glycolysis via which, in nervous tissue, most adenosine triphosphate (ATP) is produced)

Reduced ATP production = reduced Na+/K+ pump activity (major controller of intracellular osmotic environment)

Dysfunction leads to an accumulation of Na+ in the cells of the brain (particularly astrocytes)

Results in water moving into those cells (osmotic gradient) and causes the cells to swell

As swelling progresses the cells become compressed against the skull

Cell necrosis particularly frontal, parietal and occipital areas of cerebral cortex and thalamus