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MATERNAL DEPRIVATION AND MILK REPLACEMENT AFFECT THE INTEGRITY OF GRAY AND WHITE MATTER IN THE DEVELOPING LAMB BRAIN

POSTER SESSION 07 - SECTION: NEUROETHOLOGY AND EVOLUTION OF THE NERVOUS SYSTEM

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The psychoendocrine evaluation of lamb development has demonstrated that maternal deprivation and milk replacement alters health, behavior and endocrine profiles. While lambs are able to discriminate familiar and non-familiar conspecifics (mother or lamb), only lambs reared with their mother develop such clear social discrimination or preference. Lambs reared without mother display no preference for a specific lamb from its own group. Differences in exploratory and emotional behaviours between mother-reared and mother deprived lambs have also been reported. As these behavioural abilities are supported by the brain, we hypothesize that rearing with maternal deprivation and milk replacement leads to altered brain development and maturation. To test this hypothesis, we examined brain morphometric and microstructural variables extracted from in-vivo T1-weighted and diffusion-weighted magnetic resonance images acquired longitudinally (1 week, 1.5 months and 4.5 months of age) in mother-reared and mother-deprived lambs. From the morphometric variables the caudate nuclei volume was found to be smaller for mother-deprived than for mother-reared lambs. T1-weighted signal intensity and radial diffusivity were higher for mother-deprived than for mother-reared lambs in both the white and gray matters. The fractional anisotropy of the white matter was lower for mother-deprived than for mother-reared lambs. Based on these morphometric and microstructural characteristics we conclude that maternal deprivation delays and affects lamb brain growth and maturation.