

6. Summary:

Risk Factors and Prognostic Variables of Radiographic Pulmonary Disease in Neonatal Foals

A retrospective study was conducted to explore the association between selected clinical variables, the manifestation of neonatal thoracic radiographic abnormalities and the prognosis of foals with respiratory disease admitted to a referral center. The study was performed in two sections, including 128 and 163 foals, respectively.

Section one: The clinical and prognostic significance of radiographic pattern, distribution and severity of thoracic radiographic changes in neonatal foals

207 thoracic radiographs were evaluated to assess the impact of radiographic pattern recognition, distribution, and severity of pulmonary changes on short-term survival of neonatal foals. The study further investigated the association between selected clinical parameters and the radiographic manifestation of neonatal respiratory disease. The evaluation of interstitial and alveolar-interstitial radiographic patterns within the caudodorsal, caudoventral and cranioventral lung regions proved to be highly reliable between viewers in the study. SIRS was related to increased pulmonary infiltrates within the caudodorsal lung region. Dyspneic foals displayed more extensive pulmonary infiltrates within the cranioventral lung, which was associated with advanced respiratory disease and lower survival rates. A fibrinogen concentration > 400 mg/dL was also related to increased cranioventral radiographic abnormalities. In addition, tachypnea most consistently related to diffuse (caudodorsal, caudoventral and cranioventral) pulmonary changes. Neutropenia, milk reflux from the nares, upper airway pathology, abnormal respiratory sounds, failure of passive transfer (IgG concentration <400 mg/dL), immaturity or fever, however, were not related to radiographic pattern, distribution or severity of radiographic changes. Sixty-five percent of foals with radiographic pulmonary disease were discharged alive from our referral hospital. Concurrent caudodorsal and caudoventral radiographic disease was most frequently observed in this foal population. Increased caudodorsal radiographic scores retained statistical

significance as a prognostic indicator for non-survival in a multiple stepwise logistic regression analysis.

Section two: Risk factors and prognostic variables for survival of foals with radiographic evidence of pulmonary disease

The medical records of 163 neonatal foals, which had thoracic radiographs taken within 48 hours of admission to a referral hospital, were reviewed. The objective of this study was twofold:

First to identify risk factors for the development of thoracic radiographic changes, and second to identify prognostic indicators for survival in foals with radiographic evidence of pulmonary disease. Failure of passive transfer (IgG concentration ≤ 400 mg/dL) was the only multivariate risk factor for radiographic evidence of respiratory disease in 163 foals. Additionally, hypoxemic patients ($P_aO_2 \leq 60$ mmHg) were 4.9 times more likely to show radiographic abnormalities in a subset of foals with arterial blood gas results.

Foals with a creatinine concentration > 1.7 mg/dL upon presentation, dyspnea and a history of dystocia were significantly more likely to die based on the multivariate statistical outcome analysis. An anion gap ≥ 20 mEq/dL was strongly correlated with non-survival in a subset of foals with arterial blood gas results. These variables represent clinical and hematological parameters that can be readily obtained during the initial patient evaluation. The presence of a high anion gap appeared to have the greatest clinical impact and may be a useful prognostic parameter in patients with radiographic evidence of respiratory disease. In contrast, the majority of physical examination parameters, which are usually obtained during the general respiratory evaluation of foals (e.g. evaluation of tachypnea, abnormal respiratory sounds, fever, weakness and milk reflux from the nares), were unrelated to outcome.