Small animal *Review*

Summary: In this month's Small Animal Review, we summarise three recently published papers from other veterinary journals. The papers for this issue explore the impact of open registries on inbreeding, in the working Australian Kelpie population particularly, and the impact of vehicle trauma on the canine shock index, as well as the potential role for lung ultrasound in monitoring for cardiogenic pulmonary oedema in dogs being treated for left-sided congestive heart failure.

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Inbreeding in working Australian Kelpies

The danger of inbreeding has long been recognised. While it can be a useful technique for breeders to concentrate desirable traits, such as coat colour or limb length, within a breed and help offspring to be "true" to their parents' characteristics, it can narrow the gene pool, leading to a concentration of deleterious characteristics. Some of these problems can be a result of the intentional characteristics introduced into the breed (such as flat noses associated with brachycephalic airway syndrome, entropion associated with selection of cosmetically desirable eyelid conformations, or skin fold pyoderma associated with the appearance of the snouts of various breeds), but some are clustered in breeds simply by virtue of being linked by chance to desirable characteristics. For example, while Chiari malformation and syringomyelia in Cavalier King Charles Spaniels are associated with the desire to breed a particular skull shape, myxomatous degeneration of the mitral valve in this breed is not a consequence of a purposeful selection. Rather, this stems from a narrow gene pool in which deleterious recessive genes, (normally harmless in a genetically diverse population because of the presence of dominant genes), are concentrated.

One method proposed to reduce this problem is to have breeds on "open" registers, meaning animals are identified by phenotype and, where possible, by genotype. By contrast, "closed" registers only provide information to the public on those animals which are phenotypically normal. Velie et al (2021) performed a study to look at the inbreeding levels in an open-registry breed — the working Australian Kelpie. The average inbreeding coefficent was calculated from pedigree records, and this suggested a beneficial effect of opening a breed registry on inbreeding. However, the mean inbreeding per year in working Australian Kelpies was similar to that in other dog populations with closed registries.

Impact of vehicle trauma on the canine shock index

The shock index is an easily calculated measure, defined as the ratio of heart rate to systolic blood pressure. In humans, a shock index over 0.9 has been shown to be associated with severe shock and increased mortality. In dogs, it has been demonstrated that the shock index is sensitive to blood loss, as it increases after blood donation. Kraenzin et al (2020) performed a retrospective study comparing the shock index in healthy dogs and dogs that had suffered vehicle trauma (VT), to assess the prognostic value of the shock index in canine VT patients. The shock index was also compared to the animal trauma triage score, the modified Glasgow Coma Scale score, and lactate levels.

Shock index was significantly higher in dogs with VT than healthy dogs, and significantly higher in dogs that died, than VT dogs that survived to discharge. Shock index correlated positively with animal trauma triage score, but not with plasma lactate or modified Glasgow Coma Scale score. The animal trauma triage score stratifies patients by severity of injury, and higher scores suggest a poorer prognosis. The authors speculate that the lack of correlation between shock index and coma score may be because of the dysregulation of blood pressure and heart rate that occurs after head injury. It was concluded that since the shock index is easy to calculate and is related to mortality, it should be used routinely to aid clinicians in deciding which cases need further monitoring, diagnostics and intervention.

Use of lung ultrasound to monitor cardiogenic pulmonary oedema

Traditionally in cardiology cases, the use of ultrasound has been confined to cardiac structure and function, while thoracic radiogaphy has been required to assess the lungs, and particularly the presence of cardiogenic pulmonary oedema. However, ultrasound is increasingly being used to assess the presence of pulmonary disorders.

Murphy et al (2020) performed a study to determine whether lung ultrasound is useful for monitoring the resolution of cardiogenic pulmonary oedema in dogs. The study population consisted of 25 dogs hospitalised for first onset of left-sided congestive heart failure. Lung ultrasound and radiography were performed and plasma pro-B-type natriuretic peptide was measured at various intervals. The number of sites on the lung ultrasounds that were positive for B-lines (more than 3 B-lines per site) decreased between the dogs' admission and discharge. The number of strongly positive sites correlated with respiratory rate and degree of oedema on thoracic radiographs, although the pattern of oedema resolution differed between ultrasound and radiography. The authors concluded that lung ultrasound may be useful for monitoring the improvement in pulmonary oedema in dogs being treated for left sided congestive heart failure.

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