



## BLOOD GAS PARAMETERS *pVCO*<sub>2</sub> AND pH CAN PREDICT ASCITES SUSCEPTIBILITY IN JUVENILE BROILERS

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Ascites is a metabolic disorder found in broilers that have insufficient pulmonary vascular capacity. Commercial breeding programs have been continuously focussed on high growth rate which led to fast-growing meat-type broiler chickens but as a negative consequence, the incidence of the ascites syndrome increased. However, not all birds with a high growth rate will suffer from the ascites syndrome which might indicate a genetic susceptibility or resistance to ascites. Previous work within our group has led to the identification of four genomic regions containing genes influencing this disease. An additional population, a broiler dam line, was used in a whole genome scan with 20,000 SNPs in order to verify and unravel the genetics of ascites and to identify the underlying causative genes in more detail. However, phenotypic traits that can predict ascites susceptibility at an early stage of development are necessary to map quantitative trait loci more accurately.

Therefore, a pilot study was performed with which several physiological parameters (blood gas parameters: pH, *pVCO*<sub>2</sub>, *pVO*<sub>2</sub>; Hct, electrolytes: Na<sup>+</sup>, Ca<sup>2+</sup>, K<sup>+</sup>; metabolites: lactate and glucose) were investigated as candidate predictors for ascites susceptibility at an early stage of development before real ascitic signs become clinical visible. In this pilot study, one fast growing broiler sire line was used and at day 11-12 blood samples were taken from one hundred female and one hundred male chickens prior to the challenge (cold stress) at day 14. Postmortem dissection was performed on the slaughtered animals at the end of the experiment (47 days of age) and on the animals that died before the end of the experiment. Broilers that showed signs of ascites (fluid accumulation in the heart sac and/or abdomen) were assigned a status of 1 (i.e. ascitic) and broilers that showed no signs got a status of 0 (i.e. non-ascitic). A prominent interaction effect of status\*sex on *pVCO*<sub>2</sub> and pH values at day 11-12 accentuated the finding that effects of status on *pVCO*<sub>2</sub> and pH values were significantly different for both sexes. With a logistic regression analysis, a model was build on a subpopulation of the broilers that could usefully predict the status of the remaining broilers based on the sex of the broiler and the blood gas parameters *pVCO*<sub>2</sub> and pH measured on day 11-12. The model predicted 52% of all ascitic broilers (sensitivity) and 78% of all non-ascitic broilers (specificity).

In conclusion, venous blood *pCO*<sub>2</sub> and pH in juvenile broilers at day 11-12 seem to be critical factors in ascites pathophysiology and therefore, can be used as phenotypic traits to predict ascites susceptibility.

**Keywords:** ascites, broiler, juvenile, *pVCO*<sub>2</sub>, pH

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