

## **Cathepsin proteases: their potential as vaccines for the control of *Dermanyssus gallinae* infestations in commercial poultry houses**

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The legislated withdrawal of acaricides and the development of acaricide resistance have hampered efforts to control *Dermanyssus gallinae* in commercial poultry units. Previous studies demonstrated the feasibility of vaccination as a valid mite control strategy. Antibodies generated in hens against the *D. gallinae* proteins: soluble native mite proteins and recombinant antigens induced significant mite mortality after a single antibody-enriched blood meal (Bartley *et al.*, 2009 & Wright *et al.*, 2009). In order to preferentially identify genes encoding antigens that are up-regulated during/after feeding we constructed a suppressive subtractive hybridisation cDNA library. The cDNA prepared from starved mites was subtracted from cDNA prepared from fed mites; the remaining gene population representing those up-regulated in feeding were extensively sequenced. Analysis of the resulting gene database revealed a variety of putative digestive enzymes and proteins associated with oviposition. We identified an aspartyl protease (Dg-CatD) that exhibited 49% identity to the longepsin protein; a lysosomal cathepsin D-like protease found in the mid-gut and salivary glands of the *Haemaphysalis longicornis* tick with a putative role in haemoglobin proteolysis. Also identified was a cysteine protease (Dg-CatL), which exhibited 35% identity to cathepsin L-like proteins from a variety of parasitic invertebrates with several putative functions described e.g. haemoglobin digestion, vitellogenin proteolysis and host-parasite interactions. Both proteins were predicted to possess N-terminal signal peptides associated with lysosomal location (Dg-CatD) and secretion into the extracellular milieu (Dg-CatL). Recombinant forms of Dg-CatD and L were expressed and purified. Antibodies specific for Dg-CatD and L will be generated in hens and the effect of anti-Dg-CatD/L antibody-enriched blood meal on mite survival will be assessed. The potential of mite Cathepsins as vaccine candidates is discussed.

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