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Book review — Boekresensie

Breeding for Disease Resistance in Farm Animals (2nd edition)

Edited by R F E Axford, S C Bishop, F W Nicholas and J B Owen

1999. CABI Publishing, Wallingford, hard cover, 424 pp. Price £75 (US\$140). ISBN 085199-325-7.

It needs to be said at the outset that the 20 chapters that make up this book are clearly written and reasonably comprehensive, albeit probably of more interest to specialists in infectious and parasitic diseases than general practitioners. On the other hand, for anyone (such as the reviewer) with the serious hope that genetic resistance to infectious diseases of animals holds imminent solutions to intractable modern-day problems, this volume makes sobering reading. The conclusion one reaches is that, although genetic resistance has much to offer in the longer term, the immediate prospects for real progress in disease control using this approach are much more limited. The reason is quite simply that not enough is known about the fundamental principles involved in the exploitation of what is, superficially, a basic observation, *i.e.* that resistance to infectious and parasitic diseases is generally just as heritable and influenced by quantitative trait loci (QTL) as are production traits.

This point is illustrated by scrapie, where it has long been known that different species (sheep and goats) and breeds within those species differ remarkably in their susceptibility to the disease. For that reason the genetics of scrapie have been extensively studied for many years. The frequencies of genetically-determined variation in the prion protein (PrP) of different breeds of sheep and their effects on scrapie prevalence are well known. This information has been used to alter PrP frequencies (and therefore the rate at which scrapie occurs in endemic situations) by the use of rams with appropriate genotypes. However, this approach may, conversely, result in unwanted effects, such as the loss of desirable breed characteristics, selection of rare scrapie strains that are not inhibited by the sheep genotype selected for, or a selective advantage for the agents maintained by 'carrier' sheep. According to Hunter in the chapter on transmissible spongiform encephalopathies, there is evidence from mouse and modelling studies for the existence of

scrapie carriers. In practical terms, therefore, although sheep breeders are provided with new opportunities for controlling this much-studied disease, the longer-term implications are uncertain. Interestingly, cattle do not have the same heterogeneity in their PrP genes, and consequently cattle breeds do not vary noticeably in their susceptibility to bovine spongiform encephalopathy.

Most practical progress in breeding for genetic resistance seems to have been made in respect of parasitic conditions (*e.g.* helminthosis, ovine cutaneous myiasis and tick infestation in Australia) and production diseases. The latter comprise a complex of mostly undefined conditions that inhibit livestock productivity. For these diseases there is a growing realisation that the effective use of genetic resistance has to be integrated into a range of other control options to produce effective strategies.

The compendium is divided into 5 parts: principles and methods, parasites and vectors, bacteria, viruses and subviruses, and production diseases. Each part is made up of 3–5 chapters. The overview chapters on principles and methods (*e.g.* genetic maps, markers and QTLs; the immune system and the major histocompatibility complex) are more lucidly explained than is usually the case with this type of publication. Conversely, despite the wide range of animal diseases addressed, there is not much new in this volume and the impression is conveyed of another rehash. Certainly, fundamental issues that the book purports to address such as 'trying to lessen the impact of ecological perturbations involved in modern pharmaceutical intervention' are not dealt with seriously.

Nevertheless, for anyone with an interest in breeding for genetic resistance, and the principles underlying the approach, this book provides a good overview.

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