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MAPPING PRODUCTIVE TRAITS IN LIVESTOCK

INTRODUCTION

In the last 7 years a large scale world-wide effort has produced genetic linkage maps of most important livestock species. As a result of this we now have the tools to follow the inheritance of every piece of every chromosome in any pedigree, breed or selection line cross. In addition the methods that enable us to analyse the genes and DNA contained within the chromosomes have undergone many incremental improvements so that it is now a realistic research goal to find and characterise the genes responsible for multigenic or quantitative traits in livestock species.

The object of this contract was to keep the society up to date with developments in this field. The first paper gives an overview of the whole process of developing linkage maps and their subsequent use in finding genes for productive traits in animals. The remaining papers take a step by step look at how the field is developing: The first paper describes the analysis of livestock pedigrees to determine whether they show patterns of phenotype inheritance indicating whether genes of large effect are segregating. The next two papers describe the two major methods,

candidate genes and genomic scans, used to find the chromosomal position of genes influencing productive traits. The field of comparative mapping in which genetic information from one species can be linked to other species is then introduced. This enables livestock molecular geneticists to make use of information from much more intensively studied species such as humans and mice. Finally the latest developments in searching the DNA from a specific location for the gene of interest, or positional cloning as it known, are described.

Already DNA tests have been used in the dairy industry. The genetic disorder Bovine leukocyte adhesion deficiency (BLAD) was successfully eliminated from the breeding pedigrees of the Livestock Improvement Corporation using a DNA test. Our challenge now is to develop similar tests for multigenic traits so that DNA tests can be used in a positive way as well for the elimination of animals carrying a genetic defect.

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