The Bio-Economic Feasibility of Selection for Health & Production in the UK Sheep Industry

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Hypothesis

A disease may respond to genetic selection but its control and prevention may be more cost effectively managed using other methods e.g. chemical or immunological prevention.

Background

Production losses and control expenditure are the concepts by which the financial analysis of disease is measured. A non linear relationship exists between the two. The ***economic optimum*** of disease control is the most effective available method at the lowest price.

Previously, immunological (vaccination) and chemical treatments have been utilised to control a range of sheep diseases. However, questions regarding their use have been raised over efficacy, ethics and economic efficiency. A more recent option, genetic selection for disease resistance in sheep, is now possible for some diseases but how this method compares with the current economic optimum is widely unknown.

This discussion forms the basis of this project and possible answers will be presented in terms of both likely success and financial impact of a selection programme for a range of sheep health and production issues.

Genetic Selection: A Viable Control Method?

Benefits	Drawbacks
More "self sustaining" sheep	Reliability may be questionable in light of evolution
Reduced labour and reliance on chemical intervention	Unknown costs of such a project at present
Significant reduction in lost productivity	Possible trade off with production traits
Improved food safety and animal welfare	Current research into QTLs for resistance is highly complex

Should livestock be selected for resilience or resistance?

What indicators will form the basis for selection: QTLs or Phenotypes?

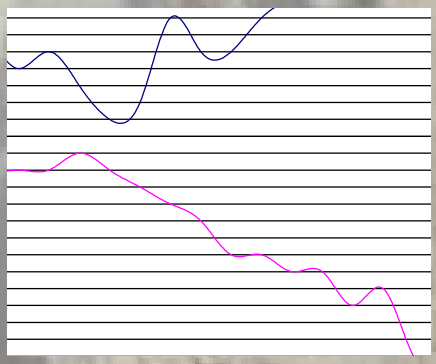
Heritability indices can be used to predict the reliability of livestock passing traits to progeny

Successful Genetic Selection: Resistance to Nematodes

Genetic technology has already been fruitfully applied to the sheep industry with the advent of the EBLEX "Better Returns Programme" which selects rams for tupping and has been suggested to add as much as £2 to the value of each lamb.

In terms of utilising genetic technology for disease control the results are more limited as this method of control is in its infancy.

However, successful genetic progress has been reported in a number of instances including an experiment which utilised faecal egg count to measure resistance to nematodes in New Zealand (Bisset et al) – illustrated below.



Selective breeding for low F.E.C. phenotype led to lambs which possessed significantly lower burdens of the majority of economically important roundworm species.

Disease Analysis

A broad range of sheep diseases were analysed for their appropriateness for consideration in this project on the basis of four criteria:

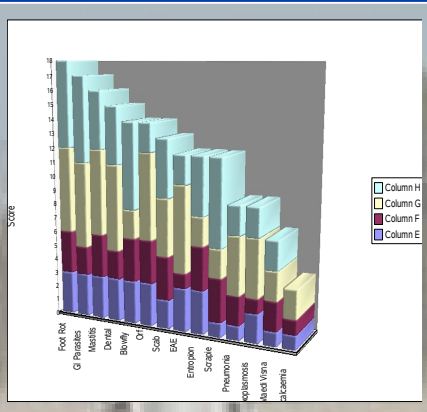
•Incidence

•Welfare Impact

•Economic Impact (x2 Score)

•Genetic Suitability (x2 Score)

Each disease was given a total score and a selection >10pts was chosen to generate a shortlist. The diseases which were selected, as well as examples of diseases deemed inappropriate for this project, and their respective scores are presented.



The following diseases have been selected at this stage of the project for economic and genetic analysis in regards to a genetic selection programme:

•Foot Rot

•Gastro Intestinal Parasites

•Mastitis

•Dental Disease

•Blowfly

•Orf

•Sheep Scab

•Enzootic Abortion of Ewes

•Entropion

•Scrapie

Other issues highlighted are breeding for so called "***easy sheep***" and sheep that do not require ***shearing***. Good ***production*** is also necessary.

Current & Future Work

Six week shepherding placement @ FAI Farms, Oxford

Economics studies

Further research into selected diseases including a number of key disease variables required for economic analysis in light of genetic selection

Development of robust phenotypic traits for selection

Estimate the likely success of the implementation of a genetic selection programme for each disease and production issue

Investigate sheep industry attitude towards the potential for genetic selection for disease control