LAMBPLAN: AN INTEGRATED APPROACH TO GENETIC IMPROVEMENT FOR THE AUSTRALIAN LAMB INDUSTRY

ROBERT BANKS

National LAMBPLAN Coordinator
c/o Department of Animal Science
University of New England
Armidale 2351

INTRODUCTION

The Australian lamb industry has been slow to adopt recommendations and methods based on animal breeding theory. Along with problems in the processing and marketing phases of the production chain, this has contributed to the failure of the lamb industry to respond rapidly to changing market demands. The industry has recently taken a new initiative in establishing LAMBPLAN, a national genetic evaluation and improvement system. LAMBPLAN is designed to meet the genetic information needs of the breeding and production sectors of the industry, and to assist in the application of improved breeding methods.

This paper summarises how genetic improvement is currently attempted in the Australian lamb industry, and how the genetic tools available to the industry are being upgraded under LAMBPLAN.

THE AUSTRALIAN LAMB INDUSTRY

The Australian prime lamb industry produces about 17 million carcasses a year, worth about $400 million. Of this production, some 17% is exported. The industry faces a number of problems, some more direct and related to the market, others longer term and more structural and biological in origin.

The more direct problems include:

- consumer demand both in Australia and overseas is increasingly for leaner, meatier lamb. The genotypes readily available in this country only produce such lambs under newer and higher risk management strategies, such as running ram lambs or cryptorchids.
- the marketing chain is, at best, somewhat confused. Clear price signals do not flow easily from consumer to producer, and thence on to suppliers of seedstock.
- producer terms of trade have been declining steadily for at least twenty years. Australian prime lambs today are worth in real terms a fifth of their value in the late '60s.

The structural/biological problems include:

- poor prices for the end product mean low returns to seedstock producers, and consequently little incentive for investment in improved breeding programs.

- prime lamb dams are to a large extent a "by-product" of the Merino industry. This can be a problem because the breeding objectives for Merinos, at least in practice, do not place great emphasis on reproductive performance, so a cross is needed to "infuse" some hybrid vigour.
- poor flow of price signals and premiums for genetic merit from the commercial lamb producer to the breeder of crossing sires (such as Border Leicesters). The first-cross ewe (most commonly Border Leicester-Merino) makes a lot of economic and biological sense, but for maximum efficiency, crossing sires should be tailored to maximise economic returns to the producer. Investment in improved breeding programs in these breeds is not encouraged by the poor flow of price signals and premiums.
- the prime lamb ewe breeds (both crossing breeds and the self-replacing breeds) are economically caught between chasing wool and meat prices. There are substantial fluctuations in the real price ratio, making optimising the breeding objective tricky.
- sheep meat production is even less biologically efficient than beef production (and both are considerably less biologically efficient than poultry and pork).

INDUSTRY USE OF GENETICS

Set against this rather depressing background, what can genetics offer this industry?

Two sources of genetic variation can be exploited: between-breed variation, through breed substitution, cross-breeding, and new breed development, and within-breed variation, through selection programs.

The Australian prime lamb industry has traditionally been based on a biologically sensible cross-breeding structure: terminal sire breed rams are mated to either first-cross (usually Border Leicester-Merino) or straight-bred (such as Corriedale, Merino etc) ewes.

This system exploits hybrid vigour for the maternal traits (reproduction and mothering ability) where cross-bred ewes are used, and for growth traits because the prime lamb is a two- or three way cross.

In theory, the system recognizes different breeding objectives for different component breeds: terminal sire breeds are selected for growth and muscular conformation, the dam breeds for reproductive ability and wool production, plus growth. How efficient these selections have been is open to some question.

LAMBPLAN

LAMBPLAN has been established to provide genetic information/tools for the lamb industry. The format of that information is designed with the production/breeding structure clearly in mind.

The first stage of LAMBPLAN provides EBV's for weight and subcutaneous fat depth, based on live animal measures. The EBV's use information from correlated traits and from relatives. In general, animal measurement and data processing are done on the same day, on-farm. The cost of this information to the breeder is $1.50-2.00 per head, depending on numbers tested and supplier (LAMBPLAN is available from State Departments and private organisations throughout Australia).

The rationale behind this first stage is:

- selection for a combination of increased growth rate and decreased subcutaneous fat is simple, effective, and economically sensible, both for the terminal sire breeds, and to a lesser extent, for the dam breeds.
- experience with the NSW Meat Sheep Testing Service has shown that this system can be successfully run at low cost, without significant administrative or processing overheads, and with high industry acceptance.

FUTURE DEVELOPMENTS IN LAMBPLAN

Clearly, from earlier comments on biological/structural problems of the industry, and from experience in other species, there are a number of valuable developments to be assessed for inclusion in a national genetic evaluation and improvement system. The list that follows is essentially a strategic plan for LAMBPLAN over the next decade.

Firstly, the breeding objective for lamb production systems is increasingly likely to include carcass traits, such as muscle shape and size, and fat distribution. These clearly will be particularly important for the terminal sire breeds. Research is proceeding on two linked paths to evaluate recording and evaluation methods for these traits:

- through use of real-time scanning equipment,
- and, longer-term, through use of CAT Scanning technology. This latter is more likely to aid through estimation of genetic parameters for a detailed range of carcass traits, so allowing refinement of evaluation procedures based on simpler measurement techniques.

Secondly, recording and evaluation systems for the dam breeds need to be developed. The first stage in this process is to obtain genetic parameters covering wool and reproductive performance for these breeds. The second stage is to design cost-efficient recording systems where records are accumulated over a number of years on animals, from which LAMBPLAN EBV's can be produced.

Thirdly, across-flock evaluation systems will be developed along broadly similar lines to GROUP BREEDPLAN (Graser et al. 1986). This will probably initially focus on the growth phase traits, but will need in the longer term to incorporate the maternal phase traits where appropriate to the breed breeding objective.

Fourthly, there is considerable value in establishing a good comparison of the breeds (sire and dam) available now or soon to enter this country. The industry is faced with a plethora of breed choice in both these broad categories with little more than anecdotal information available to guide rational decision- making.

The longer term aim for LAMBPLAN then is to provide good genetic information at two levels for two broad classes of traits:

- at the between-breed level,

- at the within-breed level,
- for those traits most relevant to the growing lamb and its market acceptability,
- for those traits affecting economic value of the prime lamb dam.

CURRENT STATUS OF LAMBPLAN

LAMBPLAN was launched in April 1989, and has been enthusiastically received by the majority of breeders in the industry. In NSW, where adoption of the former Meat Sheep Testing Service was high, the introduction of LAMBPLAN has lead to significant numbers of new clients for that service. In other states, adoption has been very satisfactory and appears to be growing steadily.

AFTERWORD

While there are some clear structural differences between the lamb industries of New Zealand and Australia, and New Zealanders have generally been well ahead in adoption of genetic technologies, there are several points that suggest that where cooperative approaches are possible, they should be seriously canvassed:

- similar reliance on grass-based production.
- similar problems and opportunities in finding and supplying export markets.
- broadly similar range of genotypes available.
- increasing economic and cultural links.

It is to be hoped that where genetic information for the lamb industry can flow in either direction across the Tasman, the relevant industry groups on both sides can ensure that opportunities for mutual benefit are maximised. This means thinking about making the information available in forms that are clearly understood by, and relevant to, breeders and producers in both countries, regardless of recording system, or other "structural" factors.

REFERENCES

Graser, H-U., Tier, B., Nicol, D.C., Scarth, R.D., Hammond, K. and Allen, J. Proc. A.A.A.B.G. 6: 124-130