A MODELLING FRAMEWORK FOR EVALUATING NEW TECHNOLOGY AND PROMOTION INVESTMENTS IN THE AUSTRALIAN SHEEP AND WOOL INDUSTRIES

by

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ABSTRACT

Challenging issues confronting the Australian sheep and wool industries in recent years include a weakened demand for wool, widespread drought, animal welfare concerns and a steady decline in Australian sheep producers' terms of trade. Less secure market environments, increased competition and lower levels of profitability highlight the importance of the efficient investment of Australian sheep and wool industry R&D and promotion funds.

This thesis develops an equilibrium displacement model (EDM) to estimate and compare the potential benefits from R&D and generic promotion investments, and other policy changes, in the different sectors and markets of the Australian sheep and wool industries. Inclusive in the model are the multiple components of the Australian sheep and wool industries to account for cross-product interactions not considered in most previous studies. A high degree of industry disaggregation within the model enables estimation of the distribution of the potential benefits among the various industry sectors.

Ten hypothetical R&D and promotion investment scenarios were modelled as 1 per cent exogenous parallel shifts in the relevant market demand or supply curves. Changes in economic surplus were calculated as measures of welfare changes in each of the various industry sectors. In summary, the results from the simulations suggest sheep and wool producers' gain more from on-farm research than off-farm research; export promotion than domestic promotion; and export promotion than most other R&D scenarios. Domestic consumers gain the largest total benefit shares from research in the domestic lamb retail sector and promotion of lamb in the domestic market.

In addition to the ten hypothetical scenarios, a proposed project from the Wool Quality research program of the Sheep CRC2 involving an increase in the demand for fine apparel wool in the European Union (EU) was simulated using the EDM. The results suggested the project would yield returns to the Australian sheep and wool industries of two and half times the costs of the investment.

Three variations to the base model were also presented. Changes in domestic wool processing cost shares and the assumed absence of a domestic wool-processing industry

in Australia were found to impact little on the distribution of benefits among industry sectors. However, not accounting for the multiple components of the Australian sheep and wool industries was shown to impact on the distribution of investment returns.

In addition to its use in *ex ante* evaluations, as a means of assisting decisions of priority setting and resource allocation, the model can be used in *ex post* evaluations of investments or government policies. It provides a consistent framework to estimate and compare the potential impacts from new technologies, generic promotions and other industry changes. The model should prove beneficial in assisting in industry policy and decision-making.

CERTIFICATE

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

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ACRONYMS AND ABBREVIATIONS

AAGIS	Australian Agricultural and Grazing Industries Survey
ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACWEP	Australian Council of Wool Exporters and Processors
AES	Allen/Uzawa partial elasticity of substitution
AMPC	Australia Meat Processor Corporation
AWC	Australian Wool Corporation
AWEX	Australian Wool Exchange
AWI	Australian Wool Innovation
AWRAP	Australian Wool Research and Promotion Organisation
AWS	Australian Wool Services
AWTA	Australian Wool Testing Authority
BCR	Benefit-cost ratio
BSE	Bovine spongiform encephalitis
CV	Compensating variation
DAFF	Department of Agriculture, Fisheries and Forestry
DAWA	Department of Agriculture Western Australia
DREAM	Dynamic research evaluation for management
EDM	Equilibrium displacement model
ESP	Early-stage wool processing
EU	European Union
EV	Equivalent variation
EVAO	Estimated value of agricultural operations
FMD	Foot and mouth disease
FOB	Free-on-board
GE	General equilibrium

IFPRI	International Food Policy Research Institute
IRR	Internal rate of return
LSP	Later-stage wool processing
MES	Morishima elasticity of substitution
MLA	Meat and Livestock Australia
MRS	Marginal Rate of substitution
MRT	Marginal rate of transformation
NPV	Net present value
PE	Partial equilibrium
R&D	Research and development
RBA	Reserve Bank of Australia
RPS	Reserve price scheme
Sheep CRC	Australian Sheep Industry Cooperative Research Centre
Sheep CRC2	Cooperative Research Centre for Sheep Industry Innovation
TFP	Total factor productivity
TWC	The Woolmark Company
VIC DPI	Department of Primary Industries Victoria
VM	Vegetable matter
WSA	Wool statistical area