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Goatmeat industry RD&E strategy – 2012 benefit cost analysis

Including recommendations on collection of industry data

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Executive summary

Benefit cost analyses were prepared for six Australian Goat Industry RD&E strategies (see Table E1). Each strategy works toward delivery of the Plan's mission. Investment returns are driven by increases in the volume and reliability of Australian goat meat supply, consequent market development and the time elapsed before benefits are realised.

Data to inform the analysis was sourced from the literature and key industry players. A list of priorities for industry data collection is included in the body of the report. Data collection priorities address the Australian goat population, industry turnoff, on-farm production, the supply chain, the profile of goat producers and human capacity.

Table E1 summarises benefit cost analysis results for core assumptions along with results for a sensitivity test on changes in goatmeat supply (pessimistic scenario). Only Net Present Value (NPV) and Benefit Cost Ratio (BCR) results are provided in the summary table. The body of the report includes estimates for other investment criteria and the impact of investment on the triple bottom line.

Table E1 Evaluation Results NPV (30 Year Analysis Period, discount rate 7%) and BCR

Strategy	Pessimistic Scenario		Core Scenario	
	NPV ($' million)	BCR	NPV ($' million)	BCR
Grazing systems	0.4	3.0	0.6	3.8
Animal Health and Welfare	0.3	2.3	0.4	2.8
Genetics	0.2	2.2	0.3	2.7
Capacity Building	0.2	1.6	0.4	2.0
Communications	0.1	1.3	0.1	1.7
Supply Chain and Marketing	0.3	2.6	0.5	3.2
Total NPV and Average BCR	**1.5**	**2.2**	**2.3**	**2.7**

Best available data ('core scenario') would indicate a total NPV of $2.3 million over 30 years and a balanced portfolio of investments with acceptable positive NPVs across all six of the strategies evaluated. The average BCR across the same set of investments and using the same set of assumptions is 2.7 i.e. for every dollar invested through the Goatmeat Industry RD&E Strategy 2012 $2.70 will be returned to industry and other stakeholders. Positive environmental and social outcomes are associated with 'Grazing systems'; 'Animal Health and Welfare'; 'Capacity building' and 'Communications'.

The sensitivity test ('pessimistic scenario') shows that even with a 20% reduction in the increase in goatmeat supply at profitable prices attributable to the Plan, a positive NPV and BCR will be delivered.

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Abbreviations and Glossary

AMPC	Australian Meat Processors Corporation
BCA	Benefit Cost Analysis
BCR	Benefit Cost Ratio
CMAs	Catchment Management Authorities
CRRDC	Council of Rural Research and Development Corporations
DAFWA	Department of Agriculture and Food, Western Australia
DPIs	Departments of Primary Industries
GICA	Goat Industry Council of Australia
GiG	Going into Goats guideline
IRR	Internal Rate of Return
MLA	Meat and Livestock Australia
NPV	Net Present Value
PVB	Present Value of Benefits
PVC	Present Value of Costs
RD&E	Research, Development & Extension
RER	Rapid Evaluation Ranking
RIRDC	Rural Industries Research and Development Corporation

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- Peter Schuster, Schuster & Associates, Industry Consultants
- Tim Johnson, Project Officer Goat Industry Development, DAFWA
- San Jolly, Productive Nutrition Pty Ltd, Principal Consultant
- Ben Swain, BCS Agribusiness Solutions, Industry Genetics Consultant.

Naturally all errors and omissions remain the responsibility of the authors.

1 Introduction

1.1 Analysis Purpose

This document is a benefit cost analysis (BCA) of the Australian Goat Industry RD&E Strategy - 2012. It includes recommendations on industry data collection. The BCA was prepared by AgEconPlus with support from Meat and Livestock Australia (MLA) staff and the Australian goat meat industry between January and June 2012.

Benefit cost analyses were prepared to identify high priority/high impact MLA investments and inform *ex post* analyses after investments have been made.

1.2 Study Approach

Analyses were completed after consideration of background reports including the Australian Goat Industry Strategy - 2012, consideration of MLA's Rapid Evaluation Ranking (RER) process and standard benefit cost analysis techniques (as outlined in the Council of Rural Research and Development Corporations (CRRDC) R&D Evaluation Guidelines, revised 2009). Data used to populate BCAs was reviewed with industry experts identified by MLA.

Costs considered in the evaluation included:

- MLA investment costs – detailed in the annual operating plans and budget in delivering the Australian Goat Industry Strategy 2012.
- Co-investment costs eg those incurred by research organisations to deliver goatmeat industry strategy projects including 'in-kind' investments.
- Implementation costs eg capital costs incurred by goatmeat producers to implement research outputs.

Benefits considered in the evaluation included:

- Potential change in enterprise profitability.
- Goat numbers for which benefits are applicable.
- Likely research adoption rate.
- Probability of research success.
- Attribution of benefits to MLA investment.

Benefit cost reporting addressed:

- The Present Value of Benefits (PVB) and Present Value of Costs (PVC) were used to estimate investment criteria of Net Present Value (NPV) and Benefit-Cost Ratio (BCR) at discount rate of 7% real. Internal Rate of Return (IRR) was also estimated.
- An analysis period of 30 years starting after the last year of investment was used to estimate strategy benefits.
- The benefit cost analyses considered the triple bottom line. Environmental and social benefits and costs were presented as a qualitative assessment.
- Sensitivity analyses were undertaken in most cases for those variables where there was greatest uncertainty or for those that were thought to be key drivers of the investment criteria. +

1.3 Goatmeat RD&E Strategies Evaluated

Analyses were completed for six of eight Goatmeat Strategies. Goatmeat strategies are:

Profitable enterprises
- Grazing Systems
- Animal Health and Welfare
- Genetics

Enthusiastic producers
- Capacity Building
- Communications

Innovative industry
- Supply Chain Management and Marketing
- Industry Analysis and Planning
- Stakeholder Engagement

The 'Industry Analysis and Planning' and 'Stakeholder Engagement' strategies were not evaluated. This was due to the difficulty in benefit identification associated with 'Industry Analysis and Planning' and in the case of 'Stakeholder Engagement' it was not possible to partition investment benefits to this strategy from other strategies. Furthermore there is no allocation of budget at the current time to 'Stakeholder Engagement' – see Table 2.1 below.

2 Overarching Data to Drive the Analysis

2.1 Proposed Budget for the Plan

Table 2.1 provides a summary of the proposed program expenditure over the five years 2012 to 2017. Annual MLA expenditure is budgeted to be approximately $400,000. The balance of investment required to deliver the strategy will be sought from partners (collaborators and co-investors) including the Rural Industries Research and Development Corporation (RIRDC) rare and natural fibre program, Departments of Primary Industries (DPIs) and the Catchment Management Authorities (CMAs).

Table 2.1 Proposed Budget for the Australian Goatmeat Strategy – 2012

Budget	MLA Budget (5 year total)	Collaborator Contributions	Possible Collaborators/ Total Investment
Profitable enterprises			
Grazing systems	300,000	100,000	CMAs, MLA Feedbase
Animal health & welfare	300,000	20,000	RIRDC, Universities, CSIRO
Genetics	200,000	0	Sheep Genetics Aust (in kind)
Enthusiastic producers			
Capacity building	500,000	250,000	DPIs
Communications	300,000	0	N/a
Innovative industry			
Supply chain & marketing	300,000	300,000	DPI's, AMPC
Industry analysis	100,000	0	N/a
Stakeholder engagement	0	0	N/a
TOTAL	**2,000,000**	**670,000**	**2,670,000**

Source: MLA August 2012

2.2 Australian Goat Industry Production and Profitability Data

Review of industry literature provides data for the cost benefit analysis. It also begins the process of identifying priorities for industry data collection. Points of note from the literature include:

- There are between 3 million and 4.4 million goats in Australia comprising between 2.6 million and 4 million rangeland goats and 400,000 domestic farmed goats (including 165,000 fibre goats and around 25,000 dairy goats). ABS data indicates that in 2010 over 1.75 million goats were either slaughtered for export, domestic markets or exported live (Swain 2010).
- Approximately 90% of Australia's goat supply is sourced from unmanaged (feral) stock. The national stable goat population is 2.7 million head with a 16% harvest rate. The upper limit on population is determined by feed supply. The unmanaged industry is not profitable when environmental and other government costs are included (Stokes 2009).
- A NSW Western Division population dynamics report forecasts a doubling of the rangeland goat population by 2021. The NSW Western Division accounts for 25% of the national goat herd (Ballard *et al* 2011).
- At the current time there is a high reliance on rangeland sourced goats. These livestock graze unimproved native browse and there is a natural upper limit on this resource. A better understanding of the upper limit of the rangeland goat population and forecasting its movement in line with seasonal conditions may be a worthwhile data collection exercise.
- In time, if the industry is to grow there will need to be supply in addition to that which can be sourced from rangeland areas. Understanding constraints on agricultural production is addressed in the strategic plan. Feedlotting of goats, which is not addressed in the strategic plan, may also be relevant.
- Growth in the national goat herd will be determined by industry profitability. Ideally the industry should have an understanding of the returns per hectare for goats (rangeland and agriculturally produced) compared to sheep and cattle for a full

range of situations. These analyses might include the complementarity of goats with other stock and the weed management capacity of a goat herd. The non-financial reasons for failure to embrace goat production also need to be understood. NSW DPI gross margins and whole farm budgets (Khairo undated) may be a useful place to start.

- There are niche markets for live goats and goatmeat supply. However rangeland goat is a price sensitive commodity (industry consultation personal communication). Table 2.2 reproduces indicative comparative meat prices.

Table 2.2 Indicative Meat Prices (Mid 2011)

Meat Type	$/kg Carcase Weight
Lamb	$5.00
Mutton	$4.20
Goat	$3.80 ($2.50 to $4.00)
Young cattle	$3.80

Source: MLA November 2011

- An average export carcase weight is approximately 17 kg and domestic carcase weights are slightly lighter at around 15kg. Major Australian goatmeat export markets include the US, live animal export is dominated by Malaysia. Most goatmeat is sourced via relatively small rangeland holdings. There are a few large rangeland operations. Boer and Boer cross goats are the mainstay of farmed goat supply (Swain 2010).

Best available data to drive benefit cost analysis of the Goatmeat Strategy is summarised in the table below for both rangeland and agricultural goat production areas.

Table 2.3 Australian Goat Industry Production and Profitability Data

	Rangeland	Agricultural Production	Source
Goat population (head)	2.6 to 4.0 million	0.4 million	Swain 2010
Annual turnoff (head)	1.6 million	0.2 million	Adapted from ABS data reported in Swain 2010
Income ($/head)	$37.74	$46.03	Adapted from DPI NSW (2006a and 2006b)
Variable Costs ($/head)	$2.22	$4.63	Adapted from DPI NSW (2006a and 2006b)
Gross margin ($/head)	$35.52	$41.40	Adapted from DPI NSW (2006a and 2006b)
Gross Value of Production – farm gate	$56.8 million (gross margin X turnoff)	$8.3 million	AgEconPlus analysis of the above data

Source: Various

2.3 Contribution of each Strategy to achieving Industry Mission

The Australian Goatmeat Industry Plan – 2012 articulates a two part mission:

- Increase the volume and reliability of supply of goats and goatmeat; and
- Develop the number and size of markets for Australian goats and goatmeat.

Each strategy works toward delivery of the Plan's mission.

Investment returns are driven by increases in the volume and reliability of Australian goat meat supply, consequent market development and the time elapsed before benefits are realised.

The assumed impact of each strategy on goatmeat supply and the time elapsed before the benefit is realised is summarised in Table 2.4 below. Estimates were made following industry consultation.

Table 2.4 Goatmeat Production Increase Attributable to Delivery of Each RD&E Strategy (%)

Strategy	Increase in Turnoff Attributable to Strategy Success (%)	Likely time from completion of research investment to market ready state (years)
Grazing Systems	1.50	5
Animal Health and Welfare	1.00	3
Genetics	0.50	10
Capacity Building	1.00	1
Communications	0.50	1
Supply Chain Management and Marketing	1.25	5
Total	**5.75**	**N/a**

According to the above table delivery of the Plan will result in an estimated 5.75% increase in Australian goat and goatmeat supply over the decade following Plan delivery. At current turnoff this equates to an additional 104,000 goats. Industry advice, including advice from goatmeat processors, is that this increase in volume can be accommodated in current and potential markets at profitable prices.

Data used to estimate investment returns from individual goatmeat strategies is presented in the following chapters.

3 Benefit Cost Analysis by Strategy

3.1 Grazing Systems

Strategy Description and Outcomes Anticipated

Developing profitable production systems that sustain the supply of goatmeat and the environment through managed goat production will involve RD&E into:

- Rangeland production – ensuring sustainable, profitable supply from the rangelands. This will include rangeland ecology and the management of rangeland production systems.

- Farmed feedbase – optimising production from the feed available in agricultural (cropping and higher rainfall) areas. This will include evaluation of alternative feeds including browse and the synergies and tradeoffs of including goats in mixed farming systems.
- Nutrition – understanding the nutritional requirements of goats and how to meet them. This will include alternative feed trials and nutrition guidelines.
- Animal management – seeking on farm management options that suit goats and producers. This will include mustering and fencing options as well as handling and production infrastructure such as yards.

Outcomes from implementation of this strategy will include 'cost of production data showing the benefits of managed supply' in both the rangelands and in agricultural areas; the availability of 'comprehensive goat nutrition guidelines'; and 'new techniques for goat management'.

Strategy Investment

A total five year MLA investment of $300,000 ($60,000 per annum) is proposed.

Benefit Estimation

This strategy will deliver goatmeat production increases, at profitable prices as a result of improved feed utilisation, nutrition and animal management. Key assumptions used to quantify this impact are summarised in the table below.

Grazing Systems

Variable	Assumption	Source
Maximum goat turnoff with potential to adopt strategy outcome (million)	1.8 million head pa	Chapter 2 analysis – Table 2.3 (addition of rangeland and agricultural production numbers)
Current goatmeat enterprise gross margin ($/head)	$38.46/head	Chapter 2 analysis – Table 2.3 (an average of rangeland and agricultural production returns)
Increase in turnoff attributable to strategy success	**1.5%**	Consultant estimate of 1% revised upwards after review by Tim Johnson DAFWA
Probability of this outcome being achieved	80%	Consultant estimate based on proposed budget and strategy components.
Attribution of the improvement to MLA's investment	85%	Based on proposed share of budget by MLA and partners detailed in the Australian Goatmeat Industry RD&E Strategy.
Likely research adoption rate	25%	Consultant estimate following industry consultation.
Likely time from completion of research investment to market ready state	**5 years**	Consultant estimate after review of strategy description.
Number of years from market ready state until maximum adoption achieved	4 years	Consultant estimate after review of strategy description.
Likely time from market ready state until strategy outcome is superseded / obsolescent	30 years	Consultant estimate after review of strategy description.

Benefit cost analysis results are summarised in Chapter 4.

Data Collection Needed

The analysis makes use of best available data. To better inform the *ex post* analysis and assist with industry development, collection of the following data is suggested:

- Goat population and turnoff estimates and forecasts especially for the rangeland areas (the major source of supply)
- Cost of production data for a range of rangeland and farmed production systems (will be generated by the Goatmeat RD&E Strategy – 2012)
- Data on the relative per hectare profitability of goats and other livestock (to assist the case for incorporation of goats into whole farm systems)
- Data and relationships to understand the link between feed, nutrition and energy supplements and goat supply.

A summary of suggestions for data collection across all strategies is provided in Chapter 4.

Comments Received During Consultation

The above analysis framework was tested with the goat industry and the following comments were provided:

- 'Cost of production data'; 'comprehensive goat nutrition guidelines' and 'new techniques for goat management' will have a positive impact on increasing reliable goat supply. Gross margins for goat production in agricultural areas are similar to sheep production. Goats have the same live weight, produce more progeny but do not generate an income from wool. It costs much less to purchase goats ($40 to $50/doe) to establish an enterprise than it does for a similar number of sheep ($100 to $140/ewe) and some variable costs are lower (e.g. goats are not exposed to fly strike). Collection and communication of evidence to support these statements will encourage additional goat producers and increase goatmeat supply (Tim Johnson, Project Officer Goat Industry Development, Department of Agriculture and Food Western Australia (DAFWA)).
- Understanding stocking rates and ration supplementation is a high priority. These drivers affect goat performance (e.g. reproduction, growth, finishing for markets) at the lowest possible cost. All agricultural and rangeland goats have to graze. Therefore any innovation in Grazing Systems has a wide ranging impact across the entire national goat population (Tim Johnson, DAFWA).
- Goatmeat cost of production in the rangelands is very low especially if infrastructure is already in place for sheep and cattle. Knowledge of the low cost of production for rangeland goats will encourage new producer participants (John Vagg, goat producer, Wilcannia NSW).
- The link between improving the feed supply base (in the rangelands and in agricultural areas) and increasing goatmeat production seems reasonable. There is a strong correlation between feed and goat supply, especially in Western Australia (Tim Johnson, DAFWA).
- Improved nutrition and energy supplements will certainly improve production characteristics, i.e. progeny rates and numbers, fattening etc., but has to be cost effective (San Jolly, Nutrition consultant).

The above assumptions used to drive the benefit cost analysis are reasonable.

3.2 Animal Health and Welfare

Strategy Description and Outcomes Anticipated

Developing management practices to safeguard the health, productivity and welfare of managed goats will involve RD&E into:

- Wild dogs and other predators – better management of predators for better reproduction rates.
- Parasites and diseases – reducing their incidence and effects in Australian goats.
- Transport and domestication – cost effective goat handling methods that are humane to goats and safe for goat handlers.

Outcomes from implementation of this strategy will include 'more management options available' for wild dogs and other predators, 'more treatment and prevention options available' for parasites and diseases, and 'supplementary guidelines for goat handling'.

Strategy Investment

A total five year MLA investment of $300,000 ($60,000 per annum) is proposed.

Benefit Estimation

This strategy will deliver goatmeat production increases at profitable prices through better reproductive rates, parasite control and improved livestock handling.

Animal Health and Welfare

Variable	Assumption	Source
Maximum goat turnoff with potential to adopt strategy outcome (million)	1.8 million head pa	Chapter 2 analysis – Table 2.3 (addition of rangeland and agricultural production numbers)
Current goatmeat enterprise gross margin ($/head)	$38.46/head	Chapter 2 analysis – Table 2.3 (an average of rangeland and agricultural production returns)
Increase in turnoff attributable to strategy success	**1.0%**	Consultant estimate of 1.5% revised downwards after review by Tim Johnson DAFWA
Probability of this outcome being achieved	80%	Consultant estimate based on proposed budget and strategy components.
Attribution of the improvement to MLA's investment	85%	Based on proposed share of budget by MLA and partners detailed in the Australian Goatmeat Industry RD&E Strategy.
Likely research adoption rate	25%	Consultant estimate following industry consultation.
Likely time from completion of research investment to market ready state	**3 years**	Consultant estimate of 5 years revised downward after review by Tim Johnson DAFWA.
Number of years from market ready state until maximum adoption achieved	4 years	Consultant estimate after review of strategy description.
Likely time from market ready state until strategy outcome is superseded / obsolescent	30 years	Consultant estimate after review of strategy description.

Data Collection Needed

Suggestions for supplementary data include:

- The cost of predation by wild dogs
- Data on the health status of goats including the cost of disease and parasites
- Supply chain losses as a result of poor handling.

Comments Received During Consultation

The above analysis framework was tested with the goat industry and the following comments were provided:

- It is necessary to control wild dogs but state governments cannot justify the cost especially in a low stocking rate environment. In Western Australia the government

has employed dog trappers in partnership with sheep and goat producers but a more efficient and effective approach is needed (Tim Johnson DAFWA).

- It is reasonable to link the control / removal of wild dogs, diseases and parasites and better transport and domestication with increased goatmeat production. The above estimates are reasonable (Rick Gates, goat producer Ivanhoe and Wilcannia).
- It is important that investments to facilitate additional goat supply are matched with market development initiatives. Price received by producers is very dependent on changes in supply (Rick Gates, goat producer Ivanhoe and Wilcannia).
- The long haul live shipment of goats for more than ten days is not popular with producers. It is an unnecessary animal welfare risk and producers prefer charter flights to Malaysia over sea voyages. Malaysia is the industry's major live export market (Rick Gates, goat producer Ivanhoe and Wilcannia).

3.3 Genetics

Strategy Description and Outcomes Anticipated

Ensuring the performance of goats in Australia through improved genetics will involve RD&E into:

- KIDPLAN – increasing the value and use of KIDPLAN, or other equivalent systems, to improve the genetics of goats in Australia, through objective breeding and selection.
- Genetic evaluation trials – generating and entering genetics data for analysis and reporting.

Outcomes from implementation of this strategy will include 'more breeders using KIDPLAN' and an increase in the 'number of evaluation trials and enterprises involved'.

Strategy Investment

A total five year MLA investment of $200,000 ($40,000 per annum) is proposed.

Benefit Estimation

Genetic gain delivered through this strategy will improve the productivity of the Australian goat meat industry and deliver additional goatmeat production. Benefits are only applicable to goats produced in agricultural systems where genetics can be improved (i.e. farmed and rangeland situations).

Genetics

Variable	Assumption	Source
Maximum goat turnoff with potential to adopt strategy outcome (million)	1.8 million head pa	Chapter 2 analysis – Table 2.3 Addition of rangeland and agricultural production numbers – genetics is relevant to rangeland production (Ben Swain and MLA)
Current goatmeat enterprise gross margin ($/head)	$38.46/head	Chapter 2 analysis – Table 2.3 (an average of rangeland and agricultural production returns)
Increase in turnoff attributable to strategy success	**0.50%**	Consultant estimate reviewed during industry consultation
Probability of this outcome being achieved	50%	Consultant estimate based on proposed budget and strategy components.
Attribution of the improvement to MLA's investment	85%	Based on proposed share of budget by MLA and partners detailed in the Australian Goatmeat Industry RD&E Strategy.
Likely research adoption rate	90%	Consultant estimate following industry consultation.
Likely time from completion of research investment to market ready state	**10 years**	Consultant estimate after review of strategy description.
Number of years from market ready state until maximum adoption achieved	4 years	Consultant estimate after review of strategy description.
Likely time from market ready state until strategy outcome is superseded / obsolescent	30 years	Consultant estimate after review of strategy description.

Data Collection Needed

Suggestions for supplementary data include:

- Data on the genetic base of the Australian goat industry, especially the rangeland flock. Rangeland goat genetic data would need to be collected over several years to remove the 'noise' associated with changes in seasonal conditions.
- Data to allow quantification of the links between genetic improvement, production and profitability.

Comments Received During Consultation

The following comments were provided:

- The link between increased use of KIDPLAN, genetic evaluation trials and increasing production is reasonable. The benefit is likely to manifest itself as an increase in growth weights rather than an increase in fertility. Even in KIDPLAN, not many producers focus on recording fertility – they are concerned with growth of the goat as this is by far the highest priority. The second major focus is resistance to worms and parasites which are a significant problem in the higher rainfall non-rangeland areas. Third priority area is fertility but this is relatively minor as most

producers are already achieving a lot of twins and triplets - goats are very fertile animals (Ben Swain, BCS Agribusiness Solutions).

- It is likely that investment in this strategy will boost carcase weight rather than the national herd and the increase in carcase weight would be permanent and cumulative (Ben Swain, BCS Agribusiness Solutions).
- The increase in turnoff percentage attributable to strategy success in the table above seems reasonable based on an indicative comparison with sheep carcass gain of 0.5kg pa due to genetic improvements (Ben Swain, BCS Agribusiness Solutions).

3.4 Capacity Building

Strategy Description and Outcomes Anticipated

Expanding the knowledge base and skill range of Australian goat producers will involve RD&E into:

- Knowledge management – drawing information and knowledge together into comprehensive and coherent formats designed for industry users.
- Extension – sharing information and knowledge to build the capacity of all contributors to the industry.

Outcomes from implementation of this strategy will include an 'updated Going into Goats (GiG) Guide available' and 'More awareness and use of GiG, with positive feedback'.

Strategy Investment

A total five year MLA investment of $500,000 ($100,000 per annum) is proposed.

Benefit Estimation

Improved communication of knowledge and extension will ensure research completed as part of the Australian Goat Industry RD&E Strategy is adopted, delivering the Strategy's Goal i.e. goatmeat production increases with additional markets. The benefit of communication/extension is estimated below and in addition to benefits attributable to other research activities.

Capacity Building

Variable	Assumption	Source
Maximum goat turnoff with potential to adopt strategy outcome (million)	1.8 million head	Chapter 2 analysis – Table 2.3 (addition of rangeland and agricultural production numbers)
Current goatmeat enterprise gross margin ($/head)	$38.46/head	Chapter 2 analysis – Table 2.3 (an average of rangeland and agricultural production returns)
Increase in turnoff attributable to strategy success	**1%**	Consultant estimate after review of the two key elements in this strategy and the budget available
Probability of this outcome being achieved	50%	Consultant estimate based on proposed budget and strategy components.
Attribution of the improvement to MLA's investment	85%	Based on proposed share of budget by MLA and partners detailed in the Australian Goatmeat Industry RD&E Strategy.
Likely research adoption rate	25%	Consultant estimate following industry consultation.
Likely time from completion of research investment to market ready state	**1 year**	Consultant estimate after review of strategy description and feedback from industry consultation.
Number of years from market ready state until maximum adoption achieved	4 years	Consultant estimate after review of strategy description.
Likely time from market ready state until strategy outcome is superseded / obsolescent	30 years	Consultant estimate after review of strategy description.

Data Collection Needed

Suggestions for supplementary data include:

- Data on how many producers and other members of the supply chain were targeted with extension messages.
- Data on producers and other members of the supply chain who have changed production practices as a result of RD&E messages.

Comments Received During Consultation

The above analysis framework was tested with the goat industry and the following comments were provided:

- It is reasonable to attribute a gain in production to extension as well as each separate R&D investment. However this gain will take time even amongst the most progressive goat farmers (Tim Johnson, DAFWA).
- Extension messages should focus on cost of production and removing the stigma and ignorance associated with goat production. Capacity building and extension will have to address how to attract young farmers into goats. The industry needs champions at field days as well as proper intern training for new stock agents by a

MLA marketing person at a farm that has an existing goat breeding business (i.e. not hobby farm) with other livestock on property where existing / older stock agents are not present. Have the GiG Guide available to new stock agent trainees and have the GiG Guide updated every two years to ensure its relevancy (Tim Johnson, DAFWA).

3.5 Communications

Strategy Description and Outcomes Anticipated

Sharing information and ideas with current and potential goat producers will involve RD&E into:

- Analysis and planning – understanding the needs and views of current and potential producers to ensure communication is effective
- Producer engagement – maintaining the interest of producers and developing two-way communication channels.

Outcomes from implementation of this strategy will include 'favourably evaluated communications plans and case studies'.

Strategy Investment

A total five year MLA investment of $300,000 ($60,000 per annum) is proposed.

Benefit Estimation

Like capacity building, communications will generate economic benefits for the goatmeat industry.

Communications

Variable	Assumption	Source
Maximum goat turnoff with potential to adopt strategy outcome (million)	1.8 million head	Chapter 2 analysis – Table 2.3 (addition of rangeland and agricultural production numbers)
Current goatmeat enterprise gross margin ($/head)	$38.46/head	Chapter 2 analysis – Table 2.3 (an average of rangeland and agricultural production returns)
Increase in turnoff attributable to strategy success	**0.5%**	Consultant estimate after review of the two key elements in this strategy and the budget available. Estimate confirmed through consultation.
Probability of this outcome being achieved	50%	Consultant estimate based on proposed budget and strategy components.
Attribution of the improvement to MLA's investment	85%	Based on proposed share of budget by MLA and partners detailed in the Australian Goatmeat Industry RD&E Strategy.
Likely research adoption rate	25%	Consultant estimate following industry consultation.
Likely time from completion of research investment to market ready state	**1 year**	Consultant estimate after review of strategy description
Number of years from market ready state until maximum adoption achieved	4 years	Consultant estimate after review of strategy description.
Likely time from market ready state until strategy outcome is superseded / obsolescent	30 years	Consultant estimate after review of strategy description.

Data Collection Needed

Suggestions for supplementary data include:

- Data on how many producers and other members of the supply chain read goatmeat program communication materials.

Comments Received During Consultation

The above analysis framework was tested with the goat industry and the following comments were provided:

- Possibly communications and extension activities should be analysed together, to avoid the risk that communication projects defaulting to a central provider. The learning experience requires two way flow of information between the information provider and the recipient. To be effective, each needs to understand the issues and constraints of the other party (Tim Johnson, DAFWA).
- Delivery of the strategy must include engagement with producers, can't be just a newsletter. Do pre-season activities around February: half day field days with people sharing experiences, gate to plate days, restaurants / chefs involved. Then in November, to wrap up; feedback; what went wrong, how to fix it. Also have MLA encourage farm visits between WA producers and eastern state producers to exchange information and experiences (Tim Johnson, DAFWA).

3.6 Supply Chain Management and Marketing

Strategy Description and Outcomes Anticipated

Consolidating profitable supply chains through market development for goatmeat and co-products, along with innovations in processing will involve RD&E into:

- Market development – growing the size and range of domestic and international markets
- Processing innovation – generating cost efficiencies and tailoring product to consumer requirements.

Outcomes from implementation of this strategy will include an increase in 'the number and size of markets' and 'new processing technologies applied'.

Strategy Investment

A total five year MLA investment of $300,000 ($60,000 per annum) is proposed.

Benefit Estimation

Investment in Supply Chain Management and Marketing will create 'pull through' demand for goats and goatmeat products. Assumptions used to quantify this benefit are summarised in the table.

Supply Chain Management and Marketing

Variable	Assumption	Source
Maximum goat turnoff with potential to adopt strategy outcome (million)	1.8 million head	Chapter 2 analysis – Table 2.3 (addition of rangeland and agricultural production numbers)
Current goatmeat enterprise gross margin ($/head)	$38.46/head	Chapter 2 analysis – Table 2.3 (an average of rangeland and agricultural production returns)
Increase in turnoff attributable to strategy success	**1.25%**	Consultant estimate after review of the two key elements in this strategy and the budget available. Estimate confirmed through consultation.
Probability of this outcome being achieved	50%	Consultant estimate based on proposed budget and strategy components.
Attribution of the improvement to MLA's investment	85%	Based on proposed share of budget by MLA and partners detailed in the Australian Goatmeat Industry RD&E Strategy.
Likely research adoption rate	25%	Consultant estimate following industry consultation.
Likely time from completion of research investment to market ready state	**5 years**	Consultant estimate after review of strategy description
Number of years from market ready state until maximum adoption achieved	4 years	Consultant estimate after review of strategy description.
Likely time from market ready state until strategy outcome is superseded / obsolescent	30 years	Consultant estimate after review of strategy description.

Data Collection Needed

Suggestions for supplementary data include:

- Description of links in major supply chains (domestic, export)
- Number of businesses and capacity of key links (e.g. industry processing capacity especially for small lots)
- Prices at various points along the supply chain
- Volumes being directed to each supply chain
- Economic descriptions of alternative supply chains (i.e. profitability maps)

Comments Received During Consultation

The above analysis framework was tested with the goat industry and the following comments were provided:

- This is the 'holy grail' i.e. to have all stakeholders contributing to a transparent supply chain where all participants add value and not cost. I think the goat industry will require a lot of work to build and develop trust between the critical stakeholders. Producers don't always trust abattoirs and vice versa. But without profitable abattoirs, producers could not turnoff goats to receive reasonable income. Without producers – no abattoir can operate (Tim Johnson, DAFWA).
- New markets that might be 'tapped' through delivery of this strategy include the undersupplied Boer infused domestic market (Rick Gates, goatmeat producer).
- There is a gap in the domestic market in terms of a properly finished and fattened carcase that may be reliably supplied in sufficient numbers. The industry needs more growers as finishers in agricultural areas. Plenty of city restaurants want to offer goat on the menu but need to know they can get reliable fresh supply for 3 months before placing on menu – currently can't rely on that so loss of a potential market (John Vagg goatmeat producer).
- However when restaurants offer goatmeat only want certain cuts. It then becomes difficult to find a market for the balance of the carcase. Perhaps MLA could invest in alternative cuts and presentation – it is amazing how Leonards Butchers can retail chicken in so many different value added ways instead of the traditional bird (John Vagg goatmeat producer).
- If well directed and complemented by efforts to identify and secure supply then it will be possible to secure new markets and deliver the benefits described. Opportunities will present in many markets if the $A continues to depreciate. I'd consider the 1.25% turnoff percentage conservative. The industry is characterised by opportunists who would readily take advantage of new markets. The issue will be attribution. Changes of 1.25% happen regularly for many reasons, both on the supply and the demand side (Peter Schuster, industry consultant).
- The main barriers to successful delivery of this strategy include a high Australian dollar and consistency of supply (both volume and quality). Goatmeat is traditionally a poor man's meat and traded as a price sensitive commodity. Differentiating high value goatmeat presents challenges. There are many potential markets for cheap, readily available goatmeat (Peter Schuster, industry consultant).
- The major supply chain problem in the WA market is that there are only two export abattoirs processing goats intermittently, and both only pay on a per head price basis instead of a per kg basis as in the eastern states. Therefore there is no

incentive to offer a fattened, prime animal for slaughter. This is a major constraint to industry development in WA (Tim Johnson, DAFWA).

- Goats are not as easy to process, (hair, thin paunch, etc.) as sheep and the recoverable co-products such as hides and offal are not as good. So processing costs are a bit higher for a normal mutton chain. Also average carcase weights are a lot less. Don't impose any more overheads on production by grading systems, etc. the markets will do that themselves (Rob Black, SAMEX).

4. Analysis Results and Conclusions

4.1 Benefit Cost Analysis Results

Benefit cost analysis results for each of the Plan's six key strategies using 'core' assumptions are summarised in Table 4.1.

Table 4.1 Evaluation Results (30 year analysis period, discount rate 7%)

Strategy	PV Benefits ($'million)	PV Costs ($'million)	NPV ($'million)	BCR	IRR (%)	Enviro	Social
Grazing systems	0.8	0.2	**0.6**	3.8	16.3	√√√	Nil
Animal Health and Welfare	0.6	0.2	**0.4**	2.8	14.6	√√	√
Genetics	0.4	0.1	**0.3**	2.7	8.7	Nil	Nil
Capacity Building	0.7	0.4	**0.3**	2.0	12.5	√	√
Communications	0.4	0.2	**0.1**	1.7	10.9	√	√
Supply Chain Management and Marketing	0.7	0.2	**0.5**	3.2	15.2	Nil	Nil
Total	**3.6**	**1.3**	**2.3**				

NB: 'Communications NPV does not sum due to rounding
Key: √√√ Strong environmental or social outcomes, √√ moderate outcomes, √ minor outcomes.

All strategies evaluated produce acceptable benefit cost ratios. In aggregate the Plan produces present value benefits of $3.6 million with present value costs of $1.3 million and a net present value of $2.3 million (30 year investment period at a 7% discount rate).

4.2 Sensitivity Testing of Results

The key assumption driving the above results is the increase in goatmeat production associated with each strategy. The sensitivity test ('pessimistic scenario') shows that even with a 20% reduction in the increase in goatmeat supply at profitable prices attributable to the Plan, a positive NPV and BCR will be delivered.

Table 4.2 Evaluation Results (NPV, 30 Year Analysis Period, discount rate 7%)

Strategy	Pessimistic Scenario		Core Scenario	
	NPV ($' million)	BCR	NPV ($' million)	BCR
Grazing systems	0.4	3.0	0.6	3.8
Animal Health and Welfare	0.3	2.3	0.4	2.8
Genetics	0.2	2.2	0.3	2.7
Capacity Building	0.2	1.6	0.4	2.0
Communications	0.1	1.3	0.1	1.7
Supply Chain and Marketing	0.3	2.6	0.5	3.2
Total NPV and Average BCR	**1.5**	**2.2**	**2.3**	**2.7**

4.3 Recommendations for Industry Data Collection

Recommendations on data collection are informed by the cost benefit analysis, existing literature and the data that is available for other comparable small primary industries (e.g. the Australian egg industry). Table 4.3 provides a data collection list and a description of each item.

Table 4.3 Key Data to Facilitate Industry Analysis and Planning

Data item	Description
Goat population	• Rangeland and agricultural population • Percentage of population in each state/territory • Historical time series and five year forecast • A forecasting model that links rainfall, rangeland feed base and goat supply
Production	• Annual turnoff – historical and forecast • Value, volume and carcase weights • Gross value of production (GVP) estimates to demonstrate industry's importance to government
On-farm data	• Cost of production data for rangelands • Cost of production for a range of farming situations • Cost of wild dogs, disease and parasites • Benchmarks on performance (e.g. what is the value of incorporating goats in a Dubbo enterprise - cost of production, gross margin visa vie enterprise alternatives, non-financial benefits like weed control, etc.) • Alternative production systems (e.g. Economics of Feedlotting goats, genetic improvement in semi wild rangelands) • Data on the genetic makeup of the Australian goat population and the link between genetic improvement, production and profitability
Supply chain	• Description of links in major supply chains (domestic, export) • Number of businesses and capacity of key links (e.g. industry processing capacity especially for small lots) • Prices at various points along the supply chain • Volumes being directed to each supply chain • Economic descriptions of alternative supply chains • The cost of supply chain losses as a result of poor handling (mortality and morbidity)
Number of goat producers	• Rangeland • Agricultural production
Markets	• Exports by volume and value (NB this is already available) • Domestic consumption • Routine market reporting for 'indicator' products • Data on market trends (e.g. changes in overseas consumption and key price thresholds, domestic consumption preferences, etc) • Product form (primal cuts, value add, live animals, etc.) • Brand development
Human capacity	• Number of researchers working in the field • Value of goat research by MLA and others • Training and skill level of producers • Young farmers entering goat production • Number of producers and other members targeted with RD&E messages and number who have changed practices as a result.

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