



Department of
Primary Industries and
Regional Development



Goldfields-Esperance Region Camel Industry Analysis

Final Report

Updated August 2020



Quantum
consulting australia

Disclaimer

The information contained within this Report has been compiled from a variety of external sources and has not been subject to an internal independent verification. Although every care has been taken to ensure that the information and opinions are correct, Quantum Consulting Australia Pty Ltd accept no liability on any basis for the findings and recommendations in this Report and will not be liable for any claim by any party acting on such information.

Furthermore, findings within this Report can be influenced by a number of unforeseen events that may occur outside of our control. Therefore, no assurance can be given that the findings contained within the Report will remain as such in the future.

CONTENTS

Executive Summary	1
Introduction	4
Background	4
Objectives	4
Research	5
Desktop Review.....	5
Consultations	7
Key Findings.....	9
Analysis	10
Market Prospects	10
WA Harvesting Capacity	12
Impacts on LGA’s.....	14
Economic Assessment	14
Proposed Camel Projects	16
Comparison.....	16
Viability of Projects	18
Industry Development	19
Suggested Steps	19
Investment Required	21
Governance.....	21
Development Pathways	23
Harvest / Demand Scenario	26
Recommendations	28
Appendix	29
Funding.....	29
Halal Processing Facilities in WA	29
Global Meat Demand and Supply Outlook	30
Camel Distribution Across Australia.....	31
Export Markets - Camel Meat	32
Viability Analysis	33
Miscellaneous Facts and Figures.....	33
Key Success Factors.....	34
References	35

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Executive Summary

During the 2018/2019 summer, the Goldfields-Esperance region of Western Australia was notably affected by drought, which brought feral camels onto pastoral, Aboriginal and crown land seeking water and food. This resulted in significant damage to property, infrastructure, livestock operations and the environment. The damage caused by feral camels triggered the need for improved management and in particular the consideration of whether there is potential to establish camel industry business activities within the region. This report represents the first step in analysing the broad impact and economic benefits that may result, and the role the industry could play, to assist with mitigating the current camel management issues being experienced in the region.

The approach to undertake the analysis included:

- A desktop review of existing reports and research on potential camel industry activity
- Consultation with relevant stakeholders and
- Consideration of the various camel related business proposals identified by proponents of a camel industry within the region.

The following summarises the key findings from the above.

A review of literature on Australia's feral camel population suggested many previous attempts to commercialise camels have been demand driven (i.e. identify a market, estimate its size and establish a venture to suit) with examples of commercial success in the camel industry generally comprising of small ventures. Of note however, WA's feral camel population is an extensive problem requiring a broader scale solution. Subsequently, this analysis primarily focused on 'supply' as the basis to identify the steps required to establish a sustainable camel industry in the Goldfields-Esperance region. Further, the starting point was to be small scale, growing organically to foster viable and sustainable camel enterprises that would also reduce WA's feral camel population in the medium to long term. A harvest / demand scenario is presented that demonstrates WA's feral camels could be harvested and placed into commercial markets.

This report presents findings from a detailed investigation, including extensive consultation, which provides the basis for practical recommendations. Specifically, a range of barriers to developing a camel industry in WA, and possible solutions, have been identified including:

BARRIER	SOLUTION
Commercial supply of camels is unreliable	GPS monitor, trap, domesticate on-farm and in a holding facility
Feral camel population varies in quality and value	Have a range of ventures using animals of different value
Camel population is spread vastly across WA	Establish a network of traps, co-grazing and farming
Transporting and handling camels can be costly	Employ outback ingenuity, clever handling and triple trailers
Export markets require scale to succeed	Start small, domestic niche focus, grow, seek exports later
No comparable industry to replicate; trial and error	Adopt <i>existing</i> codes of practice, guidelines and best practices

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

A range of issues unique to WA and/or the camel sector are identified that require a collaborative industry and government response, including:

ISSUE	RESPONSE
Range of legislative and compliance constraints	Industry and government collaborate to resolve issues
Culling and controls not reducing WA's camel population	Invest in systems and capacity to muster more effectively
WA Pastoralists trap to cull, to minimise damage	Trap to co-graze camel and cattle, and sell surplus to market
Pastoral and Aboriginal lands, different capabilities	Equip, train, develop and leverage unique features of each
Scale of commercial operations can be prohibitive	Start at a small scale, reduce the barriers to entry
WA's camel industry is inherently undeveloped	Focus on partnerships, R&D, trials, quality and customers

Camels are capable of providing a range of products for commercialisation. Other than meat and milk there are also established uses for camel hide, hump fat, hair, feet, blood and bone, offal and embryos. There is demand for camel products both domestically and overseas, mostly small, niche markets with varied prices and margins. Commencing at a small scale will enable niche markets to be accessed and slowly developed as WA's camel supply gradually increases. Long term viability of a camel industry in WA requires harvesting *and* farming, and if a stable supply of camels can be successfully established, the opportunity to value add and grow a viable industry is potentially significant. Gainful employment for residents in remote Aboriginal communities and residents in regional towns is very achievable.

A 'supply-driven' approach was used to evaluate the merits of establishing a camel industry in the Goldfields-Esperance region. High level analysis of the economic cost-benefits and the commercial viability of 'small scale' camel ventures suggests a viable industry is possible. Net economic benefits from a camel industry of up to \$70.2M could be available given investment ranging from \$6.9M to \$13.1M in infrastructure and camel industry capacity. Six small camel ventures and associated self mustering yards could generate over 50 jobs along with up to \$16.2M annual benefit to the regional economy. Many of the jobs will be on remote Aboriginal communities, with Aborigines working 'on country'. Investment of \$5.4M in supply infrastructure provides the basis for investment of around \$6.4M in commercial ventures to be assured of a regular, reliable supply of camels to grow the industry sustainably. A viability analysis of six camel ventures indicated that industry participants could potentially trade profitably, creating 16.5 direct jobs, 64 indirect jobs, generating around \$5.5M in sales, \$1.2M in trading profit (EBITDA) and \$16.1M regional economic benefit annually. The analysis also highlighted that WA should aim to harvest between 18,000 - 24,000 camels annually to reduce WA's camel population below 50,000 by 2040. Alternatively, by doing nothing and continue harvesting around 8,000 - 14,000 camels annually, using existing and anticipated mustering capacity, could result in WA's camel population exceeding 280,000 by 2040.

A recommended approach to secure a reliable supply of camels and to develop a viable, sustainable industry in the Goldfields-Esperance follows (in sequential order):

1. Fit 100+ GPS collars to feral camels to monitor camel herd movements, location and size¹ across WA.
2. Establish up to 100 self mustering yards in proximity to herds (i.e. based on GPS monitoring).
3. Establish a 'bait meat' venture supplying camel meat as bait to WA's biosecurity groups.

¹ Most likely undertaken by Aboriginal owned and operated ventures on Aboriginal lands; initially trained and supervised.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

4. Establish a central holding facility to stock camels and assure a regular supply to camel ventures.
5. Sell low quality camels for pet meat (i.e. Perth slaughter houses) and for meat meal.
6. Establish a camel dairy adjacent to the central holding facility; main product will be milk powder.
7. Establish co-grazing of cattle *and* camels on pastoral stations; to bolster *long term* supply of camels and to improve beef yields from marginal land.
8. Sell high quality camels to dairies, abattoirs, camel farms and co-grazing farms.
9. Establish a mobile dairy facility for co-grazing pastoralists to benefit from lactating camels.
10. Establish an abattoir as supply from traps, stations and holding yard approaches 6000 camels p.a.
11. Establish micro ventures that value-add camel by-products (e.g. hide, hump fat, hair, etc).
12. Once harvesting and farming can supply 14,000+ camels annually, establish 5000 head dairy, and upgrade the modular abattoir from 4,000 to 8,000/head capacity and commence exporting.

The analysis identifies four approaches to funding the development of a camel industry. The recommended approach is to apply for Federal funding under the Regional Deals program and pursue a 10-year industry development / camel reduction program. This requires a formal partnership between Local, State and Federal governments, local investors (camel industry proponents) and stakeholders in a 10 year program to reduce the feral population, establish camel farming capacity, and establish a sustainable camel industry in the region. A range of governance approaches are identified with a recommended approach focusing on Local Governments partnering with the private sector to forge a new industry that benefits the wider region and the environment. A range of key success factors are also identified to help guide the development of a camel industry in the medium term.

It is also acknowledged that as the development of a camel industry will occur in stages (as outlined in this report), that the continuation of culling programs during the development of industry components, will also be required.

This report recommends the immediate development of an industry strategy and business case to accompany grant applications and investment proposals whilst private investors are encouraged to form partnerships in developing the proposed ventures that are expected to form the basis of WA's camel industry.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Introduction

This report presents findings from a camel industry analysis for the Goldfields-Esperance region of Western Australia. It has been prepared for the Department of Primary Industries and Regional Development (DPIRD), the Goldfields-Esperance Development Commission (GEDC) and the Goldfields-Esperance Voluntary Regional Organisation of Councils (GVROC). Its primary purpose was to ascertain the viability and feasibility of the development of a camel industry within the region. The project was to define the broad impact and economic benefits that may result, and the role that industry could play, in mitigating the current camel management issues within the region.

Background

During 2018/19 a large number of camels moved into the Goldfields-Esperance region causing damage to infrastructure. In early 2019 key partners including DPIRD, GEDC, GVROC and the Goldfields-Esperance Nullarbor Rangelands Biosecurity Association (GNRBA) expressed concern over the feral camel population and the need for better management. Short, medium and long term approaches were identified to address the impacts of feral camels including:

1. DPIRD commenced work to progress feral camel mitigation strategies (e.g. culling).
2. GNRBA began working to install self mustering yards and water isolation points (e.g. to assist with culling and harvesting) on pastoral land and the desert interface.
3. GEDC investigated commercial camel projects and concepts² within the region.
4. The prospect of establishing a camel industry within the region was to be investigated.

This project evolved from point 4 above.

Objectives

The primary objective was: to deliver a Goldfields-Esperance Camel Industry Analysis report outlining an analysis of potential camel industry proposals, and assess the benefits, challenges and pathways to industry development. The report was to:

- Review the initial feasibility of all current proposals and planned options.
- Develop recommendations for viable concepts and proposals.
- Develop recommendations for government support.
- Outline opportunities for private sector investment and industry partnerships, and
- Outline funding sources for individual proposals and projects.

The project was to include a review of existing literature, consultation with industry and regional stakeholders including proponents of camel projects, and prepare a final report summarising the proposals and an analysis of their respective impacts, feasibility and credibility.

² Including pet and bait meat, meat meal fertiliser, abattoir (mobile and modular), carbon credits and camel dairy.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Research

Desktop Review

A desktop review was undertaken focusing on industry development and implications for developing a camel industry in the Goldfields-Esperance region, and specifically aimed to identify issues, barriers and opportunities. Key findings are presented below. A detailed summary was prepared as a separate document.

Issues:

- Industry development has been hampered by the lack of continuous supply of camels.
- Camels migrate across States/Territory, during drought and rains to source food and water, making harvesting unpredictable with no certainty of catch rates.
- The feral camel population is poorly defined. The actual size of the population is unknown. In 2013 the AFCMP estimated 312,000 camels; *conservative* natural growth of 5% p.a. suggests 460,000 in 2020 and growing by more than 23,000 annually.³
- WA is estimated to host between 45% and 60% of Australia's feral camel population (i.e. WA could have 198,000 – 264,000 camels), and growing by more than 9,900 annually.
- Government focus on culling has been ineffective in eradicating WA's camel population.
- Around 50% of WA's camels are on Aboriginal lands, the balance are on pastoral and crown land. Accessibility by road can be problematic, distances are great, and access for trucking can be limited.
- The quality (age, health and condition) of feral camels varies, impacting on value⁴ and usability; up to 70% of feral camels can be unsuitable for 'high value' commercial use.
- Australia has a history of reactive approaches to feral camels rather than pursuing a long term strategy to achieve eradication and commercialisation.
- Ground and aerial culling is sustained mostly because of 'damage', which includes damage to habitat, wildlife, communities, cultural sites, pastoral infrastructure and operations, hazard to motorists, and methane emissions. Aerial culling can cost \$30 to \$150 per camel depending on how many are killed during a culling program.
- Camel meat is generally low-priced in world markets as a consequence of being sought by consumers with comparatively low socio-economic status and low purchasing power.
- Studies investigating the commercialisation of camels have often focused on abattoirs as the 'vehicle' to move large volumes of camels into the marketplace, however, export-scale abattoirs need high throughput, high utilisation to be profitable, yet the supply of feral camels has traditionally been too unreliable to sustain a large abattoir.

Barriers:

- Markets for camel products are mostly niche-based, often low priced and marginally profitable.
- Muslim populations are highly accustomed to consuming camel products but many are restricted by lower buying power within a low socio-economic context.
- Australia's demand for camel products exists mostly within capital cities; camels live in Australia's remote central deserts; logistics and handling can be a significant cost component to link camels to markets within Australia and overseas.

³ It is acknowledged that this may be a conservative estimate. Other views have indicated that camel numbers in Australia could be between 300,000 to 1.2 million with population numbers doubling every 8 to 10 years which equates to approximately 10% growth per annum. There have been no recent surveys to quantify Australia's feral camel population.

⁴ For example, up to 6-in-7 feral camels can be unsuitable for live export.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

- Transporting camels requires 'single deck' trailers, lower density, higher costs per camel.
- Camels are an 'invasive pest' governed by legislated⁵ controls and regulations (e.g. farming requires fencing; camels cannot be released; not recognised as livestock for traceability).
- To increase prices for camel meat in Australia requires higher market appeal, for example, through an extensive marketing campaign to grow demand (or focus on profitable, lower volume niches).
- Native legume within the Australian desert, *Indigofera linnaei*, or poison pea, contains 1080 poison; traces found in camel meat can be toxic in pet meat and food-grade applications; remedies exist to manage this risk.
- Limited access to camels on some lands. Landholder collaboration can impede operations.
- Limited trap yard infrastructure, limited trucking capacity and limited live trade capability.
- No established, trained and reliable workforce. Training and development is required.
- High cost of utilities and transport, limited skilled staff, and delays due to breakdowns in remote areas has impeded the development of camel ventures across central Australia.

Opportunities:

- Markets for camel products exist in the USA, Asia, Europe and the Middle East, mostly where Muslim communities reside; higher value niche markets also exist that demand specialised and/or value-added product.
- Market opportunities for camel leather exists in Italy and the USA; further investigation is warranted to determine suitability for Australian exporters.
- Domestic markets exist within Australia for pet meat, and premium food-grade meat and camel milk; the markets vary in size and annual growth is low but steady.
- Reports suggest international and domestic demand requires 10,000 to 14,000 Australian feral camels p.a.
- One established and one proposed export abattoir in SA; 8-10 Halal export licensed abattoirs and 10-12 Halal boning rooms in WA; one multi-species export-licensed abattoir in Esperance on care and maintenance (that requires modifications to process up to 160 camels per day). Scope exists to supply camels to domestic meat processors.
- Continuous, long term supply of camels requires harvesting to be supplemented by camel farming.
- Australia's feral camel population is generally disease free, making it popular overseas.
- Small volume, high value niches exist for live export of around 350 camels p.a. (e.g. for breeding and dairy operations); modest returns and substantial risks are likely.
- The manufacture of ice cream and chocolate made from camel milk is feasible, nutritional / healthy and of comparable sensory qualities to ice cream /chocolate made from cow's milk.
- Reports suggest a coordinated approach to camel management (i.e. via culling) is required, funded by approx. \$4.0Mp.a.
- China is developing a domestic camel industry; export of camel products from Australia would require investment in marketing and compliance to succeed.
- To commercialise camels via abattoirs requires AQIS, Halal and export accreditation; traceability is paramount; viability assessment of export abattoirs generally show a

⁵ WA Biosecurity, Agriculture and Management Act 2007. May need to change declared status of camels from invasive pest to authorised stock to allow harvesting, farming and breeding.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

poor return on investment due to the high cost of compliance, which requires over 75% capacity utilisation to be profitable.

- Development of a camel industry brings triple bottom line benefits in employment, skills, exports, favourable environmental outcomes and benefits to Aboriginal communities.
- Revamped marketing is required; e.g. renaming camel meat for domestic food marketing purposes; camel meat branded at trade/wholesale level; careful placement of low/high value camel cuts into specific dishes and foodservice types (to yield maximum value).
- Ngaanyatjarra Camel Company has sold approx. 40,000 camels to SAMEX (SA) export abattoir since 2012 through the use of self-mustering (trap) yards and isolated water points.
- Ngaanyatjarra Camel Company has three mustering points, employs up to 40 Indigenous people, and sells camels under agreement to SAMEX.

Consultations

Phone interviews with 34 industry and regional stakeholders identified a range of factors considered critical in developing a camel industry in the Goldfields-Esperance region. Key findings follow.

Issues:

- Federal and State Government agencies have not identified an effective long term approach to the camel problem; the AFCMP (2013) was a \$16M short term project with mixed results.
- Only Aboriginals can trap camels on Aboriginal lands; only pastoralists can trap camels on pastoral lands; traps on both land types is required over the long term.
- Camel dairies are typically small scale and provide limited scope to reduce WA's feral camel population of 250,000+.
- Harvesting camels in drought periods is easier; camels will migrate to water on pastoral stations; drought-stricken camels can yield lower quality meat and can be in poor health.
- Younger camels (<3yrs of age) are generally higher quality and higher yielding in food grade markets; it is uncertain how many camels <3yrs of age can be trapped and harvested.
- Heli-shooting is effective but costly (e.g. \$1,000/hr or up to \$100 per camel culled).
- WA could be gaining 12,000-plus new born camels each year; harvesting 10,000-15,000 feral camels p.a. is unlikely to reduce the feral population in the medium-long term.
- Camels regularly migrate 70km – 500km. Fixed self mustering yards will capture camels migrating past. If herd movements were monitored and better understood, semi-mobile traps could be used to supply more camels and reduce the population more effectively.

Barriers:

- The nearest licensed, Tier 1 export abattoir to Kalgoorlie is in Esperance (Central Agri Group); the facility is currently on care and maintenance; has capacity to handle multi-species but not camels; would require assurance of 100 camels per day to invest in upgrades to re-open (i.e. can process 160+ camels per day); located on 600ha property with capacity to hold 300-500 camels for processing; has a rendering plant and can process / supply pet meat if required.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

- Abattoirs face significant compliance requirements; AQIS; MLA traceability; import country requirements; Halal; Ausmeat standards; ESCAS; and food-health regulations; these factors contribute to high overhead costs, which requires high throughput for an abattoir to achieve viability.
- Australia's Export Supply Chain Assurance System (ESCAS) may not approve live export of camels to the Middle East because their slaughter processes can be deemed inhumane; live exports may require amendments with the help of RSPCA, MLA and Government, which could take 5+ years.
- 100+ years of camels in Australia has not delivered a camel industry; there is minimal infrastructure, no supply capability, no downstream value-adding, and minimal R&D; the future of WA's camel industry is largely trial and error.
- Potentially up to 10,000 camels are culled annually on WA pastoral lands for no commercial gain; if paid a nominal \$200/camel supplied for commercial purposes, pastoralists could share in \$2,000,000 extra income annually⁶.

Opportunities:

- Livestock carriers have adapted sea-containers to carry 80+ camels on triple trailers, which is proving more economical and comparatively easier to load and handle camels.
- Australia's camel dairies represent a cottage industry; they are at an early-developmental stage of the lifecycle; time to scale-up, innovate and value-add.
- Australia has not yet developed the expertise to utilise feral camels in an industry that is economically, environmentally and socially beneficial and sustainable.
- The Australian Government should investigate a food-aid program with the UN and World Bank to deliver camel meat where starvation is problematic (e.g. refugee camps, famine, natural disasters, etc).
- Build and operate a mobile pet food abattoir, relocated to pastoral sites to supply quartered, chilled camel carcasses for processing into pet meat;
- Camel products include meat, milk, hump fat, feet, hide, tail hair, blood and bone, and offal; markets exist for these products, domestically and overseas.
- Co-grazing cattle with camels on marginal pastoral lands; camels have a unique intestinal bacteria (biome) that helps breakdown poor-quality grasses (e.g. Mulga and Spinifex); when camels and cattle share water troughs the cattle ingest the bacteria, which improves weight gain in cattle; marginal pastoral lands become more productive through co-grazing⁷;
- Rather than process camels in the desert region, establish a large holding yard in proximity to Laverton or Kalgoorlie; accumulate camels, feed and breed a large herd to support a commercial facility; gradually expand the range of commercial activities at the holding yard.
- To get a reliable supply of camels, establish a network of 100+ self mustering yards; fit GPS trackers onto 100-200 'Judas' cows⁸ to monitor and understand herd movements across WA; use a portable, trapping system that can be relocated to muster large, remote herds.
- Continuity of camel supply will require feedlots and holding yards to stock 1000 camels to support a small abattoir and ancillary operations (e.g. dairies, bait meat, pet food, and meat meal).

⁶ This does not include the additional number of camels culled by the DPIRD and GNRBA, however, as at the date of release of this Report, those numbers were unknown.

⁷ Co-Grazing Cattle And Camels. By A Phillips, J Heucke, B Döriges and G O'Reilly, RIRDC, 2001.

⁸ Judas cows rather than bulls because cows flock together with their young; bulls mate in winter and wander during summer, often alone, seeking out cow herds.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

- DPIRD, WA Farmers Federation and industry run trials with camel meat-meal fertiliser on crops and soils to establish the effectiveness for regenerative and conventional farming.
- Aboriginal Lands Trust, Indigenous Business Australia, Indigenous Land Council, Many Rivers and Federal Government grants (via RDA) could help fund trap yards, water isolation points, feedlots or a mobile abattoir on Aboriginal lands.
- Aim to value-add camels <5yrs old; and use camels >5yrs old for dairy herd, pet meat or meat meal.
- Expand WA's wild dog baiting program; increase the volume of camels used in bait meat from 200 to over 400 p.a.; establish a new venture harvesting camels to increase the supply of 1080 dog baits.
- The Goldfields-Esperance has around 1-in-5 residents originating from overseas (e.g. from NZ, Philippines, India and South Pacific) and are generally well accustomed to working in low-skilled positions such as camel dairy, abattoir, meat meal plant, etc.
- Commence with increasing the supply of camel mustering traps; relocate 'quality' camels (e.g. 2-12yrs old) to holding yards (e.g. feedlot) or co-grazing facilities; select 'high quality' camels for breeding and dairy; use low quality camels for bait meat, pet meat and meat meal (fertiliser);
- The Australian Arab Association of WA (AAAWA) can be a conduit to a domestic market for camel meat; AAWA has 6,000 members, with over 15,000 Arabs and 85,000 Muslims living in WA; significantly more live on the east coast of Australia (e.g. >500,000); AAWA members would buy chilled camel meat, for example, if marketed directly (e.g. online, delivered, chilled); Halal certification would be required.
- The Federal Government's [Emissions Reduction Fund](#) allows landholders to adopt emissions abatement activities that generate and enable the selling of carbon credits; large scale harvesting of feral camels could reduce methane emissions and this warrants further investigation with ERF to determine the value of credits available.
- There are three Aboriginal camel ventures in early planning stages in the Goldfields-Esperance including a self mustering facility, an abattoir, and a camel farming facility.
- A Perth based pet meat supplier is converting a pet meat slaughter facility into a food-grade abattoir that will have the capability to process camels and multi-species.

Key Findings

Key findings from the desktop review and stakeholder consultation include:

- Traditional approach to feral camel eradication has not reduced the population.
- Significant resources are spent on camels, at significant economic cost (e.g. > \$10M p.a.).
- Camels have a value greater than the cost to shoot and cull.
- Camels inherently offer a wide range of products; high potential for value-adding.
- WA has operators with significant expertise and capability in camels.
- Markets exist in Australia and overseas to underwrite feasibility and secure finance.
- Continuity of supply of camels is paramount. A long term approach is required.
- Start small and progress slowly in developing a camel industry in WA.
- It is vitally essential that Aboriginal communities, pastoralists, camel experts and service providers collaborate in adopting new approaches to develop a camel industry.
- Australia's domestic market can be an initial target until commercially ready for export.
- Many challenges facing a camel industry in WA but most can be overcome.
- Cost to develop a camel industry is likely to be less than maintaining the status quo⁹.

⁹ For example, \$750,000 annual cost to Goldfields-Esperance LGA's + cost of invasive pest programs + cost of damage to desert region from camel herds.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Analysis

Market Prospects

Market insights gleaned from published literature, consultations and desktop research provide an indication of market prospects for camel products, as outlined below.

Australia

Australia currently has seven camel dairies producing milk, cheese, skincare and cosmetic products, focusing mostly on the domestic market and exporting small volumes to niche markets overseas. Two dairies are located in WA. Australia has one 'large' multi-species (camel) abattoir in Peterborough (SA), SAMEX, specialising in camel meat, that focuses on export markets (e.g. Morocco, Middle East and Asia) and niche markets domestically (e.g. wholesale and retail). SAMEX reportedly processes around 8,000-10,000 (mostly feral) camels annually (i.e. Ngaanyatjarra Camel Co supplies around 6,000 camels p.a. to SAMEX). Australia has over 600,000 Muslim residents with an established 'taste' for camel products, and support a domestic market for camel meat, milk and specialised products, mostly within migrant-rich suburbs. Anecdotally, demand within Australia for camel products exceeds the available supply. Opportunity exists to market 'factory direct' to end users within Australia (e.g. online, via clubs/associations, suburb-specific and specialised food service outlets).

Milk Products

Camel milk (2-3% fat) is lower than cow's milk (6-9% fat); contains more iron and vitamin C than cow's milk; is high in immunoglobulin's (i.e. immune-boosting substances that aid auto-immune diseases, allergies and autism); and is high in insulin (i.e. beneficial for diabetics). Camel milk powder, ice cream, yoghurt, chocolate, cosmetics and skin care are growing in popularity globally, particularly among health conscious consumers and/or more affluent Muslim consumers. The global camel milk market was forecast to grow by 7% p.a. during 2018-2022. The main competitor (substitute) for camel milk are plant-based milk alternatives such as soy milk, almond milk, and coconut milk that offer low fat, low cholesterol benefits. Camel milk retails online in Australia for \$10 - \$20 / litre. Freeze dried camel milk powder retails online in Australia for \$150 - \$200 / kg and wholesale prices range from \$60 - \$90 / kg. Camel [milk powder](#) has a wide range of uses in [household](#) and commercial markets (e.g. infant formula, nutritional supplements and medicinal formulations) and benefits from an extended shelf life (e.g. 6-9 months). Australia produced 180,000 litres of camel milk in 2019, with over 60% exported as fresh milk to Singapore, Malaysia and Indonesia, milk powder was also exported and demand is growing steadily.

Meat Products

The Middle East is the world's largest market for camel meat, producing over 183,000 tonnes in 2018 and importing around 1,000 tonnes. Niche markets for camel meat exist in the USA, UK, Europe and Asia, mostly where African and Middle Eastern immigrants have settled (e.g. Minneapolis, USA, is home to over 1 million Somalian's). In 2018, Saudi Arabia consumed 113,000 tonnes of camel meat (US\$746M), UAE 35,000 tonnes (US\$154M), and Oman 25,000 tonnes (US\$112M) – the majority produced domestically. In 2018 Oman dominated Middle East imports of camel meat buying 954 tonnes (US\$3M) at an average price of US\$3,110 / tonne (i.e. low compared to Saudi Arabia's import price US\$4,935 / tonne and export price US\$7664 / tonne). Australia's wholesale and export camel meat prices range from \$4.50 - \$5.50/kg whilst Australia's retail prices for camel meat range from \$9.00-\$16.00/kg. Australia's feral camels can yield 140-180kg of prime meat resulting in a wholesale value of \$700-\$900 per camel (i.e. ex-abattoir plus the value of by-products such as hump fat, feet, hide, tail hair, blood and bone and pet food meat).

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

If Australia's 605,000 Muslim residents consumed 2kg of WA camel meat annually it would amount to 1210 tonnes of prime cuts (\$12.1M retail value) or approximately 8,070 camels (A\$7.2M wholesale price ex-abattoir); alternatively, if WA's 55,000 Muslim residents consumed 3kg of WA camel meat annually it would amount to 165 tonnes of prime cuts (A\$1.65M retail value) or approximately 1100 camels annually (A\$0.9M wholesale price ex-abattoir); WA's 15 Halal certified butchers sell camel meat on a regular basis although supply can be limited at times.

A summary of the global demand and supply of meat during 2017-2028 is presented in the [appendix](#).

Pet Meat

Australia's pet food market is worth an estimated \$3.5B annually and growing at 4.6% p.a. (i.e. \$160M). Raw pet meat suppliers in Australia source a variety of meat including horse, donkey, mutton, kangaroo, beef and goat. The average pet in Australia consumes in excess of 30kg of pet food annually and anecdotally, pet food suppliers are unable to source a sufficient supply of camel meat. One camel can provide up to 250kg of raw meat or enough to feed eight pets annually (i.e. Australia has an estimated 4.8M dogs and 3.9M cats, eating around 261,000 tonnes of pet food annually). If camel meat accounted for 1.0% of Australia's pet food consumption it would require 2610 tonnes or around 13,000 camels annually. Alternatively, as a guide, 3500 tonnes of roo meat is exported annually for pet food. Australia's pet meat market is large and growing and demand for camel pet meat is expected to remain strong over the medium term. However, wholesale prices are comparatively low in the range of \$1.50 - \$2.50/kg (i.e. \$375-\$625 per camel) although direct (e.g. online) sales to end users would provide a higher price and a better return on investment (e.g. \$4.00/kg net retail price results in \$800 per camel ex-factory).

Specialised Products

Camel hide is used traditionally in the Middle East to make shoes worn by cameleers, Bedouins and camel enthusiasts, reportedly selling at a high price because of their durability. Camel leather is significantly thicker and stronger than cow leather and is used to manufacture specialist bags and accessories in Italy. Camel hump fat is rich in nutrients, is a high quality cooking oil, lends itself to numerous food preparations, and is gaining popularity in the superfood sector. Camel tail hair is 'woolly' by nature and has applications within industrial and consumer brushes, Australia has nine brush manufacturers. There is a wide of range of niches for specialised camel products and some could potentially be manufactured within Aboriginal communities using modern technology at a micro scale to service small niches at premium prices.

Conclusion

Australia's domestic market for camel products is largely niche based. There are no high volume, high price markets within Australia seeking 'volumes' of camel products. However, there are several niche markets within Australia that could be accessed by small ventures that grow sales organically through marketing and product development. Export markets for camel products exist in a range of countries and could provide additional sales once domestic sales are established and further growth is required. Development of export markets typically requires 2-3 years lead time. Camel products from the Goldfields-Esperance could be exported via Fremantle or Perth Airport depending on sales volumes and product values.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

WA Harvesting Capacity

Ngaanyatjarra Camel Company (Ng Co) has two self mustering yards and a water isolation facility (i.e. 100km south of Warburton) and employs 6-8 staff year round. During 2013-2019 camel sales from Ng Co. averaged 5,540 head annually and were sold exclusively to SAMEX in Peterborough (South Australian Meat Export, a licensed, tier 1 export abattoir). Ng Co is planning to introduce heli-mustering during 2021-2022 to increase sales by 50% to around 10,000 camels per year. Consultations indicated SAMEX would buy 20,000 camels per year from Ng Co however, camel supply is irregular and NG Co prefers to grow organically. The Australian Feral Camel Management Program determined significantly more camels were located near the NT/WA/SA border (e.g. Surveyor Generals Corner, refer to the [appendix](#)) and that traps close to this point would be expected to catch *significantly* more camels. The Blackstone Community, near Surveyor Generals Corner, are reportedly starting a camel mustering and harvesting operation with plans to supply camels to SAMEX (i.e. same buyer as Ng Co). Closer to Laverton, Karrawang Community is partnering with Puccannu Community to begin trapping and harvesting camels. By 2021-2022 there could be 6-8 self mustering camel yards on WA's Aboriginal lands (i.e. potentially employing 20-30 staff, harvesting 14,000 - 18,000 camels annually, with up to \$4.5M in sales). It is anticipated the majority of camels harvested from WA's Aboriginal lands could be sold and trucked to SAMEX.

Prenti Downs Station (east of Wiluna) has forty self mustering yards, for culling camels, which reportedly cost \$1.0M to install. On average, Prenti Downs has culled 760 camels annually during 2015-2020. Highest year on record was 2019 with 2438 camels culled. During 2019 the GNRBA recorded around 10,000 camels culled on pastoral lands in the Southern Rangelands.

WA Camel Harvest - Cull

	2013	2014	2015	2016	2017	2018	2019	2020
NG Camel Co. (harvested/sold)	6682	6661	5003	4212	3807	5839	6580	
Prenti Downs (culled)			584	726	655	1293	2438	140
TOTAL	6682	6661	5587	4938	4462	7132	9018	140

The *existing* camel harvesting capacity on WA's Aboriginal lands is in the range of 12,000 – 20,000 camels annually (i.e. matching SAMEX's annual requirement). Pastoral stations on the southern rangelands are culling up to 10,000 camels p.a. (according to GNRBA). A better understanding of camel movements within the western central deserts (e.g. from using GPS trackers) would enable more effective placement of self mustering yards to optimise transport and handling, establish co-grazing operations, minimise damage, and reduce the feral camel population. Expanding the network of self mustering yards in WA, for example, from 42 in 2020 to 86 in 2021 could potentially increase the supply of *harvested* camels to 22,000 p.a. (or more). Majority (e.g. 18,000) are likely to be sold to SAMEX. The balance could support the *establishment* of the Goldfields-Esperance proposed bait meat and meat meal operations, a dairy operation and a central holding facility. The assumption is most of the camels harvested on WA's Aboriginal lands will be sold and trucked to SAMEX rather than the Goldfields-Esperance, hence pastoral stations will play a pivotal role in establishing harvesting and co-grazing capacity to support growth of the Goldfields-Esperance camel industry. To this end, a network of self mustering traps and co-grazing on pastoral stations is required in establishing a reliable, regular supply of feral and farmed camels to sustain commercial operations in the Goldfields-Esperance (i.e. other critical components include a central holding yard and a 'Judas' network to monitor herd movements).

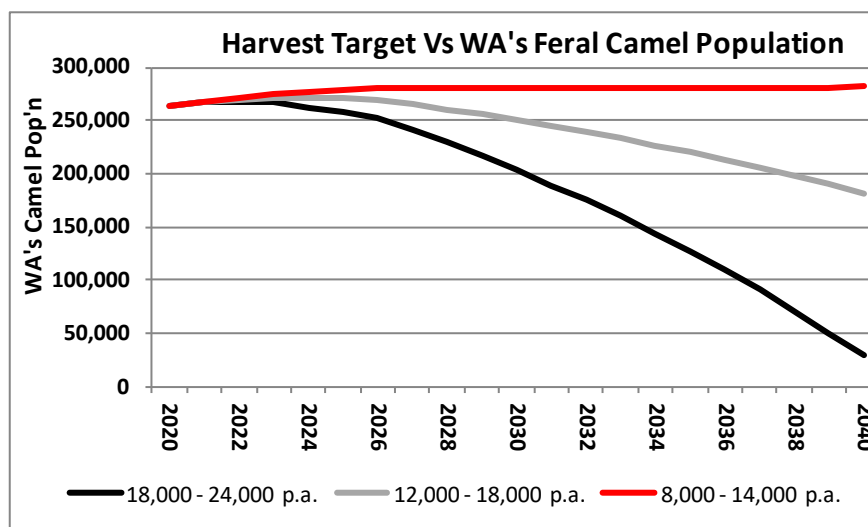
GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Indicative Cost to Expand Mustering and Monitoring Capacity

An underlying premise of establishing a camel industry in the Goldfields-Esperance is taking a supply-driven approach to ensure any investment in value-adding can be assured a regular supply of quality camels. Using GPS trackers on 'Judass' camels to monitor herd movements across WA will inform the placement of self mustering yards, ground based mustering operations, and forewarning of potential damage from feral herds. The self-mustering yards would be located on pastoral lands at the crown land interface as well as on Aboriginal lands, in particular, where herds are known to congregate. It is anticipated the pastoral stations would retain some of the 'quality' camels (e.g. camels in calf and pregnant camels) to co-graze with cattle. The remaining camels would be sold and relocated to a holding yard to supply camel ventures as and when required. Indicative preliminary costs to establish the 'supply-driven' infrastructure is shown in the table below. The suggested infrastructure could generate around 25-40 jobs within remote Aboriginal communities.

Item	Unit Cost	Quantity	No. Jobs	Investment Cost
ONE Self Mustering Yard on Pastoral Land	\$25,000	100	5-10	\$2,500,000
ONE Self Mustering yard and 1 x Water Isolation Point on Aboriginal Land ¹⁰	\$375,000	4	24-40	\$1,500,000
100 GPS Camel Tracking Collars	\$200,000	1	2-4	\$200,000
TOTAL			31 - 54	\$4,200,000

Indications are that harvesting *less than* 14,000 camels in WA each year may not reduce WA's camel population below 280,000 by 2040. However, a gradual increase in harvesting of up to 24,000 camels annually could potentially reduce WA's feral camel population to below 50,000 by 2040. In the short-medium term this would require farming capacity to be developed (by 2030) to assure a stable supply of camels well into the future. Conclusion: invest in capacity to harvest 18,000 - 24,000 camels annually to reduce WA's feral camel population to below 50,000 by 2040, or alternatively, do nothing and continue harvesting around 8,000-14,000 camels annually resulting in WA's camel population approaching 280,000 by 2040 (as shown below). Refer to the [appendix](#) for further details.



¹⁰ Includes bore, plumbing, solar pumps, fencing, vehicles, equipment and ancillary materials etc; which can already exist on pastoral stations.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Impacts on LGA's

The Goldfields-Esperance region has six local government areas (LGA's), forty one pastoral stations and numerous Aboriginal communities that have been significantly impacted by feral camels. Each Shire was asked to provide an estimate of the negative economic impacts (costs) caused by camels annually. Cost estimates were based on Shire records, discussions with Pastoralists and costs that could be attributed to feral camels. Three categories of cost¹¹ were used to estimate camel-induced impacts at the LGA level as shown below.

ESTIMATED ANNUAL COST OF IMPACTS AT LGA LEVEL DUE TO FERAL CAMELS				
LGA (No. of camel affected pastoral stations in the LGA)	Damage to Infrastructure	Direct Control and Management Costs	Impacts on Livestock Production	TOTAL
Dundas (8)	LGA: \$ 15,000 Pastoral: \$120,000	\$180,000	\$155,000	\$470,000
Leonora (?)	\$ 20,000	\$ 10,000	\$ 10,000	\$ 40,000
Menzies (5)	LGA: \$ 10,000 Pastoral: \$50,000	\$ 10,000	\$ 10,000	\$ 80,000
Ngaanyatjarraku (0)	LGA: \$ 7,000 Community:\$27,000	\$ 20,000	(no livestock) \$ 0	\$ 54,000
Wiluna (14)	LGA: \$ 0 Pastoral: \$20,000+	\$ 25,000	\$10,000+	\$ 55,000+
Laverton* (14)	LGA: \$10,000 Pastoral: \$30,000	\$15,000	\$10,000	\$65,000
TOTAL (41)	\$309,000+	\$260,000	\$195,000+	\$764,000+

* No estimates available, average LGA costs used. In 2019 Laverton contributed \$25,000 to GNRBA for invasive pest control.

Estimated total impacts (costs) attributed to camels, at the LGA level, in the Goldfields-Esperance in 2019/20 was over \$764,000. Costs will fluctuate with seasonal variations (i.e. drought / flood and herd migrations). Main implication is the region spends significant time, resources and capacity in response to feral camels for minimal financial return and no credit for the environmental benefit gained from removing camels. A significant share of the responsibility for managing the camel population falls on pastoralists, Aboriginal Communities and LGA's. This is unlikely to change without more effective strategies nationally or the development of a commercial camel industry locally. Investment in a Goldfields-Esperance camel industry would enable the region to redirect its efforts to commercial returns and economic benefits, and deliver more effective environmental management in the long term.

Economic Assessment

In 2013 the Australian Feral Camel Management Project (AFCMP) reported Australia's economic costs due to feral camels "were estimated to be \$11.5 million per year (direct control and management: \$2.5m; livestock production losses: \$3.5m; infrastructure: \$5.5m)"¹². Since 2013 Australia's feral camel population is likely to have increased from 312,000 to around 439,000 (i.e. a

¹¹ **Damage to infrastructure** included pastoral and public lands with damage to fences, yards, windmills, water troughs, taps, gates, buildings, etc; **Direct control and management costs** included pastoralists and public servants participating in culling, herd control, mustering and approaches to control camels; **Impacts on livestock** included competition for food, water and land, relocating livestock, and replenishing water and feed supplies;

¹² Ninti One Limited (2013). *Managing the impacts of feral camels across remote Australia – final report of the Australian Feral Camel Management Project*. McGregor M., Hart Q., Bubb A., and Davies R. editors. P.3

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

conservative 5% p.a.)¹³ and so too the economic cost *per year* may have increased from \$11.5M to around \$16.1M.

In 2014 DAFWA estimated 'the possible damage feral camels could potentially inflict on the WA economy over 30 years would average \$7.3M *cost per year*' (i.e. with no culling, no management), compared to \$3.8M *benefit* with culling and management¹⁴. That is, "if continued low-level control is undertaken in WA to maintain camel numbers at their current level, the benefits to sheep and cattle pastoral enterprises would be \$3.8 million per annum". WA's current program of monitoring and controlled culling helps prevent a potential cost to WA of \$7.3M p.a.

In 2013 AFCMP estimated there were around 312,000 feral camels in Australia and that the natural population growth was likely to be in the range of 5%-7% p.a.¹⁵ WA is estimated to account for 45% to 60% of Australia's feral camel population (i.e. WA could have 198,000 – 264,000 camels), that could be increasing by 9,900 to 18,480 annually. Aerial culling remains one of the most effective 'rapid' mechanisms to control camel numbers whilst mustering and ground culling is less effective but helpful in certain circumstances. The AFCMP reported aerial culling costs \$25–\$50 per head if large numbers are removed (e.g. >1000) or around \$75–\$150 per head if smaller numbers are removed (e.g. 500–1000). The use of aerial culling to 'maintain camel numbers at their current level' in WA (i.e. removing say 15,000 camels annually) would cost in the range of \$0.75M to \$2.25M per year (i.e. a lower cull level would potentially increase the camel population and drive economic costs towards \$7.3M per year).

During 2010 to 2013 the AFCMP (i.e. Federal government funded \$16.0M project) trialed commercialisation to reduce the camel population and successfully removed 25,000 camels for commercial gain over three years. The AFCMP concluded 'a sustainable industry will require camels to be farmed'. To this end a high level assessment of the economic costs and benefits of a camel industry in the Goldfields-Esperance indicated farming and commercialisation may be beneficial and sustainable. The analysis scoped six projects based on concepts proposed within the Goldfields-Esperance, which were mostly small scale ventures that could grow over time as supply and capacity improves. The favourable benefit-cost ratios and net present values are largely based on environmental gains (i.e. benefits) and reduction in economic costs (i.e. savings) from reducing the camel population, and generating economic output (i.e. sales and jobs). The economic analysis indicated that all six ventures have potential to generate favourable economic outcomes for the region and could collectively form the basis of a sustainable, commercial camel industry in the Goldfields-Esperance. Net economic benefits of up to \$70.2M could be realised given investment of \$6.9M to \$13.1M in infrastructure and camel industry capacity (as shown on the following page).

It is important to note, that whilst the establishment of the various business ventures will make a contribution to addressing the feral camel problem in the Region, it is still likely that a government sponsored culling program (of some form) will continue to be required. The extent and cost of this is unknown and will be dependent on the ultimate harvest numbers achieved by the proposed business ventures.

¹³ Refer to footnote 3, page 5

¹⁴ Strategic Report, Impact Assessments for Vertebrate Pests in Western Australia. D. Cook, DAFWA, 2014. P.60.

¹⁵ Refer to footnote 3, page 5

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

	Meat Meal Plant	Small Modular Abattoir	Camel Dairy	Bait Meat	Self Mustering Yards	Holding Facility	TOTAL
Appraisal period (years)	20	20	20	20	20	20	
Capital Costs	\$264,000	\$4,564,000	\$690,000	\$170,000	\$560,000	\$750,000	\$6,998,000
Whole of Life Costs	\$439,000	\$5,164,000	\$990,000	\$240,000	\$630,000	\$1,150,000	\$8,613,000
Cost-benefit analysis of <u>economic</u> costs and benefits at 8% Discount Rate & 20yr life							
Present Value of Benefits	\$4,231,930	\$31,497,874	\$15,849,703	\$6,686,226	\$4,565,790	\$15,243,479	\$78,075,003
Present Value of Costs	\$347,535	\$4,872,165	\$840,005	\$204,631	\$594,631	\$938,950	\$7,797,918
Benefit Cost Ratio	12.2	6.5	18.9	32.7	7.7	16.2	
Net Present Value	\$3,884,395	\$26,625,708	\$15,009,698	\$6,481,596	\$3,971,159	\$14,304,529	\$70,277,084

Conclusion:

To do nothing other than ongoing ‘monitoring and culling’ and comparatively low-level harvesting (i.e. trapping and selling 8,000-10,000 camels p.a.) is likely to continue costing the Goldfields-Esperance around \$764,000 annually in impacts and damage, especially during drought years. Alternatively, Government and private investment of \$6.9M to \$13.1M could establish a camel industry yielding up to \$70.2M in net economic benefit, generating up to 50+ new jobs, and potentially reducing WA’s feral camel population to a sustainable level within twenty years.

Proposed Camel Projects

Comparison

Phone interviews were used to scope details on three proposed camel projects in the Goldfields-Esperance. None of the proponents were able to provide documentary evidence of viability, investment performance or business planning. The following matrix outlines ‘estimates’ of costs, benefits and outputs to compare and contrast three proposals. The comparison provides a broad indication and must be viewed as indicative until the projects can be validated through a more rigorous process.

Criteria	Meat Meal Venture	Small Modular Abattoir	Camel Hub
Product	Meat meal	(modular / mobile abattoir)	Dairy, pet food, meat meal, farming, and meat
Business Model	Low quality camels milled into meat meal, creating organic fertiliser, selling to farms / growers within WA (e.g. pivot irrigation crops, horticulture crops and regenerative farms).	High quality camels processed in a niche-scale modular abattoir, producing chilled quartered carcasses and boxed prime cuts; marketed domestically (e.g. online, wholesalers and retailers) and overseas.	A camel hub; farming and breeding camels; operating a bait meat operation and camel dairy, and supplying camels to a meat meal operation, pet meat processors and abattoirs / slaughter houses.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Supply Chain Logistics	Camels are culled on Stations; mobile digester / crusher-shredder is taken to site, camels are transformed into dried meat meal; finished product is stored in bulk bags or containers and delivered by road to farms.	Camels sourced mostly from Aboriginal lands. Camels trucked from mustering yards to a small modular abattoir. Abattoir produces chilled quartered carcasses for sale to wholesalers (e.g. Halal butchers) OR chilled prime cuts boxed ready for direct sale to consumers (online) or Halal retailers and wholesalers.	Camels collected from pastoral and Aboriginal lands; trucked to a holding yard 'hub'; assessed and allocated to bait meat, pet meat, meat meal, dairy, abattoir, farming / breeding; multiple camel activities located at the 'hub'; minimal transport and handling; end products delivered by road to wholesalers, retailers and end users.
Scale of Operation	500-1000 camels p.a. 200-400 tonnes p.a.	2000 – 6000 camels p.a. 300 – 900 tonnes p.a.	1000 – 3000 camels p.a.
Capacity to Address WA's Feral Camel Population	Low. Singularly, unlikely to reduce WA's camel population.	Low-Moderate. Singularly, limited capacity to reduce WA's camel population.	Low-Moderate. Singularly, low-moderate capacity to reduce WA's camel population.
Estimated Capital Cost	\$100K - \$300K	\$4M - \$6M	\$200K - \$1.0M
Economic Benefits	1-2FTE jobs \$140K-\$200K output p.a.	4-8FTE jobs \$2.0M-\$3M output p.a.	2-6FTE jobs \$0.5M-\$1.5M output p.a.
Status	Proceeding to pilot scale operation. Proponent has experience with camels and slaughtering (i.e. pet meat operations). Aims to establish a mobile facility and test / trial camel-based fertiliser with farmers.	Early pre-planning. Seeking finance and funding. No definitive source of camels. Business model and steps to commercialisation are yet to be finalised.	Early prelim-planning completed. Seeking a RED grant to establish a bait meat facility and move to commercialisation. Has experience in camels and camel dairies, pastoral sector and livestock transport. Partnership is in place and is seeking others to join the 'hub'.
Assumptions	Mobile digester can be successfully developed and made operational; meat meal is a cost-effective fertiliser and demand is sustainable; pastoralists continue to supply 'low quality' camels after other selling opportunities emerge; the price of camel-based fertiliser will be competitive and sustainable.	Regular supply of 'high quality' camels is available; project capital can be sourced via grants, loans, equity, in-kind and partnering; domestic markets can be accessed to buy available output; project can identify a 'champion' to drive it from concept to post-commercialisation; camels from Aboriginal lands can be delivered to new abattoir instead of SAMEX.	Government will expand the wild dog baiting program to include more camel meat; new bait meat venture will 'trigger' the 'hub' and other camel ventures locate adjacent; camels can be sourced from pastoralists and Aboriginal lands; a hub site can be found and secured; the hub can establish a camel dairy - with buyers willing to pay market prices; hub ventures can be sustained during years 1-3 until critical mass is achieved in years 4+.
Success Factors	Trials succeed and buyers switch some of their fertiliser requirement to a new organic alternative; cost of logistics can be minimised; profit can be achieved in short term and sustainable thereafter; camel supply grows to support expansion into a range of crop / farm	Multi species abattoir. Export and Halal licensed facility. Throughput >60% capacity. Support from domestic Muslim population. Online facility selling direct to end users (maximising profit). Exporting to high-priced niche markets (e.g. Brunei). Traceability, quality control and disease free	Hub stakeholders share knowledge and expertise. Camel supply grows faster than the Hub. Investors support and fund value-adding within the Hub. Hub profile and growth stimulates scale expansions. Pastoralists grow capacity and Hub gets supply-push impetus.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

	applications;	status will be critical.	
Risks	Supply of camels is not assured; unsuccessful trials delay development of workable prototype; final price is too high to secure farm sales;	Project capital cannot be secured; project is delayed and timelines extend indefinitely.	Supply of camels fluctuates and ventures stagnate. Ventures run out of capital due cost over-runs. Price of end products doesn't enable profits and re-investment. Compliance and regulations slow growth and viability.
Likelihood of 'Buy in'	Moderate	Moderate	Moderate-high
Recommendation	Support. Fund.	Hold. Monitor	Support. Fund.

Viability of Projects

Three camel projects were proposed by regional stakeholders. Each project was at an early, preliminary stage of planning and none could provide a documented summary of their viability, investment performance or business plan. The projects represented six commercial ventures that could potentially form the basis of a Goldfields-Esperance camel industry. A high level viability assessment was undertaken for each of the six camel ventures using data from stakeholders, published literature, online sources and in-house references. The analysis provides an indicative assessment of the potential viability as a preliminary step in identifying projects that could be recommended for further investigation. The analysis is based on each project operating in a 'likely case' scenario at 100% of the 'proposed' scale of operation (except the abattoir, 75%). The analysis indicates the industry participants could trade profitably, creating 16.5 direct jobs and 64 indirect jobs, generating around \$5.58M in sales, \$1.2M in trading profit (EBITDA) and \$16.1M economic benefit annually. The positive benefit-cost ratios and NPV's indicate potentially viable ventures. Given effective management of each individual venture, the WA camel 'industry' could potentially develop to improve performance beyond the 'likely case' shown below.

Scenario: Likely Case	Meat Meal	Abattoir	Bait Meat	Dairy	(20) Self Mustering Yards	Holding Facility	Total
No. Camels p.a.	600	3000	400	300	600	1000	5900
Capex	\$264,000	\$4,564,000	\$170,000	\$690,000	\$560,000	\$750,000	\$6,998,000
Sales	\$147,000	\$2,865,000	\$420,000	\$1,092,000	\$160,000	\$900,000	\$5,584,000
Expenses	\$125,000	\$2,140,000	\$360,000	\$860,000	\$70,000	\$800,000	\$4,355,000
Profit / Loss (EBITDA)	\$22,000	\$725,000	\$60,000	\$232,000	\$90,000	\$100,000	\$1,229,000
Profit / Loss (pre-tax)	-\$12,320	\$131,680	\$37,900	\$142,000	\$17,200	\$2,500	\$318,960
Benefit : Cost	0.7	2.2	6.1	5.7	2.2	1.7	
NPV (20yrs, 8%)	\$215,999	\$7,118,157	\$589,089	\$2,277,810	\$883,633	\$981,815	
Payback Period (yrs)	12	6	3	3	6	8	
No. Jobs (direct)	1	7	2	4	0.5	2	16.5
No. Jobs (indirect)	3.9	27	8	16	2	8	64.4
Total Benefit p.a.	\$426,300	\$8,308,500	\$1,218,000	\$3,166,800	\$464,000	\$2,610,000	\$16,193,600

Note, the number of jobs for self mustering yards is shown as 0.5FTE for 20 yards on one pastoral station whereas 2-4 yards on one Aboriginal community's land will employ up to 10 FTE's (due to terrain, remoteness, access, etc).

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

For comparative purposes, a ‘worst case’ scenario is presented in the [appendix](#).

Industry Development

Suggested Steps

The development of a camel industry in the Northern Territory, South Australia and Western Australia has been explored on several occasions during 2000-2018. The focus has traditionally been on upgrading an established abattoir or developing a new abattoir within proximity to feral camel populations, and marketing camel meat to overseas markets foremost and accessing domestic markets where available. In 2015 an ‘improved’ industry model was proposed to capture *and* farm feral camels and therein domesticate the camels in preparation for transporting¹⁶. However, the proposed camel farm was deemed prohibitively expensive given the venison-style fencing and stock handling facilities required to supply 38,000 camels annually to sustain a global-scale abattoir. Since 2013, the Ng Camel Co. has benefitted from establishing mustering facilities near remote feral camel populations and has successfully supplied camels to SAMEX who in turn has succeeded in developing export markets. WA has the beginnings of a camel ‘supply’ industry that requires further development before processing and value-adding can commence in the Goldfields-Esperance.

This current project asked stakeholders ‘*what is the best approach in developing a camel industry – what is the starting point?*’ For comparative purposes the following table presents four approaches to developing a camel industry; two ‘aged’ approaches and two ‘recent’ approaches. The ‘recent’ approaches, dated June 2020, suggest starting small, growing slowly, focusing on building a reliable supply of camels, and proceeding gradually towards capital intensive plant to establish a value-added capability.

Comparison of Suggested Steps

Rouda, 2003	CACIA, 2005	Bergmann, 2020 ¹⁷	Camel Hub, 2020 ¹⁸
Market Scoping Study 1	Development Plan / Feasibility Study	Establish working group	Feasibility-scoping study, verify initial phase and follow-on stages
WA Camel Industry Forum	Expressions of Interest from Investors and Operators	Assess alternate uses, identify ‘lowest hanging fruit’	Commence a small dog bait venture and small dairy operation
Herd Demographic Survey	Sign Heads of Agreement	Establish pilot plant for easiest, most viable use	Establish a meat mill plant, supply as fertiliser
Pilot Domesticated Camel farms	Abattoir Site development	Market scoping study	Value-add camel milk into powder for export
Market Scoping Study 2	Commissioning / Commencement	Feasibility on high capital cost projects (options)	Establish slaughter unit for pet meat (in prep for food grade meat prod’n.)
Investigation of Essential Support resources	Bounty-funded industry development program	Establish co-grazing on pastoral stations	Commence food grade meat production; sell direct to wholesalers and public (e.g. online)

¹⁶ The feasibility of developing camel abattoirs in central Australia: A contemporary desktop economic analysis for establishing a camel abattoir in the south West region of the northern territory. Department of Primary Industries and Fisheries NT. March 2015

¹⁷ Personal Communication, June 2020.

¹⁸ Personal Communication with Camel Solutions Australia Pty Ltd, June 2020.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Establish WA Camel Association		Establish central feedlot (3000+ holding capacity)	Establish live camel export trade (for breeding, food and dairies)
Effect legislative Changes		Establish commercial scale plant (based on viability)	Establish export of camel embryos
		Establish mobile dairy for Stations and Feedlot	6+ year program as outlined above
		Expand self mustering network, integrate feral population with sustainable farming, focus on value adding and direct-to-market	

In 2005 a report¹⁹ for the Central Australia Camel Industry Association highlighted ‘critical success factors for industry development’ that remain relevant in 2020, these are outlined in the table below along with a recommended response for the Goldfields-Esperance region.

Critical Success Factors	Recommended Response for Goldfields-Esperance
1. Sustainable long-term supply of camels at economic prices.	Expanded network of self mustering yards; co-grazing cattle and camels on remote Stations; network of 100+ GPS tagged ‘Judas’ camels to monitor herds, mustering and migrations; a feedlot and holding yard in a central location.
2. A viable ongoing mustering capability.	GPS monitoring of feral herds; wider network of water isolation points; geographically dispersed self mustering yards; Pastoral and Aboriginal Lands harvesting camels in drought and wet seasons.
3. An economically viable Halal and export accredited slaughter and boning facility.	Purpose built modular abattoir, niche scale (3000-4000 head p.a. later expanded to 8000+ camels p.a.), tier 1 export licensed, working at or above 80% design capacity for 40 weeks p.a.; Alternatively, at a lower capital cost, modify the Esperance ²⁰ abattoir to process 30,000 camels p.a.; or transport camels to an existing abattoir in WA or SA capable of processing camels (refer to the appendix for details).
4. Sustainable economic markets for the products.	Domestic Muslim population, Australian restaurant market and Aust gourmet-niche markets. Overseas wholesale and retail markets (M. East, USA, EU, UK and Asia). Premium meat cuts, high value-added.
5. Business operators prepared to run the meat works and/or market the camels.	Camel ‘hub’ supporting 3-4 independent ventures, collaborating on logistics, marketing, R&D, and staff.
6. A well funded and targeted market development program.	Provincial and Industry branding, publicity and social media, relationships/networks, demand-pull program
7. A cohesive camel industry association.	Collaboratively funded industry development program
8. A champion to bring this all together.	GVROC Beneficial Enterprise (or alternatively a Regional Subsidiary) ²¹ as the parent entity for accountability, program acquittal and development oversight (e.g. Board / Management Committee).

¹⁹ *The Northern Territory Camel Industry At The Crossroads*. Strategic Insights. 2005. P.46-59

²⁰ Trucking from mustering yard to Esperance: 1200-1500km @ \$0.15/km per camel; transport cost \$180-\$225 per camel; viability requires ex-abattoir cost / price <\$700/camel; transport could be >30% of wholesale price, risky / unprofitable.

²¹ Refer to discussion on this model in the Governance section at the end of the table.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Investment Required

A preliminary, indicative estimate of the investment required to establish a camel industry in the Goldfields-Esperance region is outlined below. Further investigation is required to verify the cost estimates and re-assess the economic benefits and commercial viability. The indicative total cost is \$13.1M which includes \$5.45M for supply infrastructure, \$6.475M for commercial infrastructure, and a \$1.1M (10%) contingency.

Item	Indicative Cost
100 GPS Tracking Collars (6yr monitoring program)	\$ 200,000
Management of GPS Collar Program (6ys)	\$ 250,000
100 Self Mustering Yards on Pastoral Land	\$2,500,000
(8) Self Mustering Yards near FOUR Aboriginal Communities	\$1,500,000
Management / Admin of Industry Development Program (5yrs)	\$1,000,000
300-camel Dairy facilities, plant and equipment	\$690,000
600-camel Meat Meal facilities, plant and equipment	\$265,000
4000-camel Modular Abattoir (export capable)	\$4,600,000
300-camel Bait Meat facilities, plant and equipment	\$170,000
1000-camel Holding facility, plant and equipment	\$750,000
Sub Total	\$11,925,000
10% contingency	\$1,192,500
TOTAL	\$13,117,500

Governance

Three options have been identified as potential mechanisms to organise-manage the development of a camel industry in the Goldfields-Esperance region, as outlined below. A critical assumption is that a 10 year program is required for a camel industry to establish and evolve. Industry participants will likely come and go, flexibility will be required in how camel industry ventures are created, nurtured and sustained; and a medium-long term horizon will be required in reducing the feral camel population.

Further discussion on the Beneficial Enterprise and Regional Subsidiary model is provided after the following summary table.

Governance Type	Pro's	Cons
Beneficial Enterprise (preferred) or alternatively a Regional Subsidiary	<ul style="list-style-type: none"> • Conduit within the LG Act for a specific purpose body to be established with LGA's as "co-owners" (i.e. via GVROC). • Auditable entity operating within the general LGA probity framework (albeit less onerous e.g. to receive and acquit grant funds and loans). • Can be dissolved or re-purposed in the future when required. 	<ul style="list-style-type: none"> • Could impose additional compliance and reporting on camel start-up ventures. • Relatively new concept (i.e. Beneficial Enterprise yet to be enacted and Regional Subsidiary introduced 2017) , could have teething problems. • Local politics influencing outcomes rather than driven by commercial

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

	<ul style="list-style-type: none"> • Access to LGA CEO's and Presidents and GVROC's Executive Officer for commercial guidance (if required). 	<p>industry stakeholders.</p> <ul style="list-style-type: none"> • Private sector investors and commercial ventures becoming 'hitched' to the entity (e.g. via agreements and accountability).
Inter-Agency Venture	<ul style="list-style-type: none"> • Agency or Statutory Authority as parent entity administering grants, loans, plans. • Consortium of Agencies, pooling knowledge, expertise and influence. • Established systems for probity and accountability (i.e. grant acquittals). 	<ul style="list-style-type: none"> • Could impose additional compliance and reporting on camel start-up ventures. • Agency / Ministerial politics interfering with commercial decisions and outcomes. • Agency staff can change, affecting relationships and momentum / progress.
Private	<ul style="list-style-type: none"> • Privately owned Pty Ltd or Ltd entity, ideally operating within a Co-operative or Joint Venture framework. • Govt could be a shareholder – partner. • Private sector as driver of industry development program (Govt monitors results, performance, accountability). • Demonstrates collaborative approach (e.g. PPP) to industry development, raising profile and credibility / support. 	<ul style="list-style-type: none"> • Private investors as majority owners, Govt as a minority owner could be vetoed, biasing decisions and integrity. • If fully privately owned, vulnerable to failings / hardships of investors, possible insolvency / liquidation / etc. • Private entities may not collaborate, share, leverage capabilities; industry could become fractured and evolve without reducing camel population.

Beneficial Enterprise

As part of the State Government's reform agenda, a new Local Government Act will be drafted. A stated objective of the reform agenda is to transform local government so that it is empowered to better deliver quality governance and services to their communities now and into the future. One element that is being considered is the opportunity for local governments to run businesses as an area of reform.

Currently under the Local Government Act 1995 (the Act), local governments have two options for forming independent corporate bodies:

- Regional local governments; and
- Regional subsidiaries.

A local government cannot form or take part in forming, or acquire an interest giving it the control of, an incorporated company or any other body corporate other than a regional local government or a regional subsidiary. In this regard a new model is being considered and referred to as *Beneficial Enterprises*.

A driver for the consideration of new models to deliver services is that the local government sector has been requesting that it be given additional powers to form independent corporations. These entities could be used to manage a local government's existing business activity or pursue new commercial opportunities.

Support for this include WALGA who have expressed a view that beneficial enterprises provide greater flexibility to local government to enter into joint ventures and partnerships while protecting ratepayers from legal liability and financial risk.

The proposed model indicates that initial funding for the establishment of the beneficial enterprise would be borne by the local government. The proposed attributes of a beneficial enterprise would appear to be an effective approach to organise-manage the development of a camel industry

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

in the Goldfields-Esperance. The unknown factor is if and when will amendments to the Act occur enabling the use of a beneficial enterprise.

As a fall back, an alternative structure of a regional subsidiary is discussed below.

Regional Subsidiary

A regional subsidiary is designed to be a convenient way for local governments to pool their resources and cooperate more closely with neighbouring districts.

In addition to increasing the efficiency of existing services, a regional subsidiary may increase the viability of new services which local governments want to provide. It may also form a mechanism for groups of local governments to come together to deal with region-specific issues.

A regional subsidiary is governed by a charter document, the content of which is tailored to suit the function that the subsidiary will perform. The regional subsidiary is similar to a statutory regional local government as defined in the Local Government Act 1995 (also known as a “Regional Council”). It differs in the sense that:²²

- a) It is predominantly regulated by its charter.
- b) It cannot borrow money except from participant local governments.
- c) The management board of the subsidiary is not restricted to councillors and local government officers.

To form a regional subsidiary, a group of two or more local governments (‘the participant councils’) must prepare a charter that is approved by the Minister for Local Government.

The ability to form regional subsidiaries was introduced in 2017 as a way of encouraging local governments to work more closely together with neighbouring councils to deliver services. As a result, a regional subsidiary is smaller in scope and subject to less regulation than a regional council. The governing board can consist of members who are not elected members or local government staff thus allowing people with special expertise to be engaged to oversee the activities.²³

An alternative to a beneficial enterprise or a regional subsidiary is an incorporated association formed by participating LGA’s for the purpose of regional development. As an example, in 2007 five LGA’s formed the Outback Highway Development Council Incorporated (OHDC Inc) with the purpose to “cause the upgrade and sealing of the Outback Way, for the good of the nation”. Since 2007 the OHDC Inc has secured \$230 Million to upgrade and seal sections of the 2700km route between Laverton (WA) and Winton (Qld). The OHDC Inc aims to finish the project by 2025/26. A similar entity could be adopted for the Goldfields-Esperance Camel industry development project.

Development Pathways

Four development (funding) pathways have been identified that could provide the momentum needed during the formative years to successfully establish a camel industry in the Goldfields-Esperance, as outlined in the table below. A hybrid approach incorporating the ‘best’ elements of each option is also possible.

Pathway and Features	Pro’s	Con’s
----------------------	-------	-------

²² https://www.dlgsc.wa.gov.au/docs/default-source/local-government/regional-subsidiaries/approval-policy-regional-subsidiaries.docx?sfvrsn=4066ebbc_2

²³ https://www.dlgsc.wa.gov.au/docs/default-source/local-government/local-government-act-review/beneficial-enterprises/beneficial-enterprises-summary-discussion-paper.pdf?sfvrsn=74c7d8df_2

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

<p>Regional Deal 10yr partnership with Local, State and Federal Govt and private sector (investors) to advance the GE region and camel industry via shared aims, funding and resourcing.</p>	<ul style="list-style-type: none"> • Regional Deal is a Federal Govt program to address a national problem (e.g. camels) and grow industry/jobs in areas of high unemployment (e.g. Communities). 	<ul style="list-style-type: none"> • Govt's change, priorities change, project could waiver, tainting the region or project midway through.
<p>Aboriginal Lands Focus Collaborative pooling of ALT, ILC, IBA, NIAA, Many Rivers, etc to invest in infrastructure and enterprises on Aboriginal lands as the main focus in the short-medium term, to 'kick start' the development of WA's camel industry (e.g. a supply focus).</p>	<ul style="list-style-type: none"> • Maximum benefit to remote communities (jobs, enterprise, social, environment, industry, etc). • Demonstrates collaborative approach by Govt to solve camel problem and community enrichment. • Encourages Aboriginal enterprises to form alliances with established operators to grow their business. 	<ul style="list-style-type: none"> • Private sector may / may not invest in critical 'downstream' components. • Remote enterprises can sometimes face unique challenges that could prove fatal. • Risk of some ventures not surviving and the camel problem not being addressed as hoped. • Political risk could be damaging. • SAMEX may get the majority of camels due to existing arrangements and capabilities.
<p>Private Operator Driven Private operators fund and resource their individual camel ventures leveraging their capabilities, networks and marketing, building relationships and ventures where required.</p>	<ul style="list-style-type: none"> • Free market forces will largely determine if the industry is sustainable and profitable. • Proponents have complete autonomy in steering business growth. No gov't interference (other than grants and policy support). • Gov't can call expressions of interest to summons the best candidates to grow the industry. 	<ul style="list-style-type: none"> • No certainty of developing an integrated industry over time. • Different timelines, rates of achievement and resourcefulness could fragment the industry. • Without government support the industry could flounder and the camel problem deteriorates and costs / impacts escalate.
<p>Middle East Investors Coordinated 10yr industry development plan proposed to Middle Eastern Consulates to finance WA camel industry development for long term supply of camel products, operated by remote communities and pastoral sector with Gov't oversight.</p>	<ul style="list-style-type: none"> • Lump sum investment program could fast-track infrastructure to deliver camel products in 2yrs. • Links world's largest camel-consuming market to world's largest feral camel population. • Advances Australia's capability in commercialising and eradicating feral camels. • M.E. technology transfer option (e.g. tannery, dairy, milk powder) 	<ul style="list-style-type: none"> • Regulations, compliance and legislation could cause delays and disputes. • Foreign investment in industry can bring negative publicity (e.g. FIRB, profit repatriation, taxes). • No certainty M.E. investors would participate, project could become stranded and stall. • Export-focused industries have an inherent vulnerability.

A following page sets out a recommended approach to develop a camel industry in WA. The approach addresses recognised barriers, leverages comparative advantages and focuses on elements government can support. Key features of the approach include:

- Supply capacity is greatly increased, aided by the capability to monitor camel herd movements across WA's southern rangelands using GPS collars, and thus provide greater certainty of a regular supply to generate enterprise and industry viability (e.g. consistent quality, volume and price).
- Commencing with a small, sustainable venture, momentum can be quickly established and leveraged to introduce additional ventures, building critical mass to support progressively larger investment in higher value-adding ventures.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

- Pastoralists 'opt in' to co-grazing cattle and camels and/or establishing self mustering yards; Aboriginal Communities 'opt in' to establish self mustering yards (and possibly camel dairies) and participate in herd monitoring (e.g. via the Judas tracking program). Communities can potentially get involved in a wide range of niche ventures creating significant employment and enterprise opportunities.
- Recurring natural increases in the feral camel population determines the initial harvest and production targets. Co-grazing (i.e. camel and beef farming) slowly builds capacity to supply camel enterprises without relying entirely on the feral population. Improvements in the scale and effectiveness of mustering slowly reduces the feral camel population. As knowledge and expertise is gained, and herd movements are better understood, traps and mustering can be pin-pointed to reduce the remaining feral camel population to a significantly lower and sustainable level.
- Partnerships and collaboration are leveraged to develop an industry that is guided by R&D, innovation, market research and the rigours of food and export compliance.

A recommended approach to secure a reliable supply of camels, and to develop a viable, sustainable industry follows (in sequential order):

- Fit 100+ GPS collars to feral camels to monitor camel herd movements, location and size across WA²⁴.
- Establish up to 100 self mustering yards in proximity to herds (i.e. based on GPS monitoring).
- Establish a '1080 bait meat' venture supplying camel meat bait to WA's biosecurity groups.
- Establish a central holding facility to stock camels and assure a regular supply to camel ventures.
- Sell low quality camels for pet meat (i.e. Perth slaughter houses) and for meat meal.
- Establish a camel dairy adjacent to the central holding facility; main product will be milk powder.
- Establish co-grazing cattle and camels on pastoral stations; to bolster long term supply of camels and improve beef yields on marginal grazing country.
- Sell high quality camels to dairies, abattoirs, camel farms and co-grazing farms.
- Establish a mobile dairy facility for co-grazing pastoralists to benefit from lactating camels.
- Establish an abattoir as supply from traps, stations and holding yards approaches 6000 camels p.a.
- Establish micro ventures that value-add camel by-products (e.g. hide, hump fat, hair, etc).
- Once harvesting and farming can supply 14,000+ camels annually, establish 5000 head dairy, and upgrade the modular abattoir from 4,000 to 8,000/head capacity and commence exporting.

²⁴ Most likely undertaken by Aboriginal owned and operated ventures on Aboriginal lands; initially trained and supervised.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Harvest / Demand Scenario

This study adopted a ‘supply-driven’ focus to identify a development pathway for the Goldfields-Esperance camel industry. Demand *and* sales remain an important issue. Preliminary investigations during this study identified end markets, mostly within WA and Australia, and significantly more markets overseas. The following table sets out a supply – demand scenario to demonstrate the possible utilisation of harvested WA camels based on market demand identified during this study. Further detailed assessment is required.

Key points:

- 70% of feral camels harvested are assumed to be low quality, suitable for low value adding (shown in blue font).
- 30% of feral camels harvested are assumed to be high quality, suitable for high value adding (shown in red font).
- Camels harvested from Pastoral lands are fully allocated from year one (2021).
- As demand grows, additional camels are sourced from Aboriginal lands; SAMEX and the Port Pirie abattoir are assumed to buy surplus camels harvested on Aboriginal land.
- Low-level sales commence in 2021, increasing slowly, as harvest capability improves.
- The holding facility plays a pivotal role in distributing ‘quality’ camels to Goldfields ventures and domestic industry / markets.
- Dairy and co-grazing grow incrementally, slowly increasing capacity and value-add.
- Multi-species abattoir commences 2024 at a ‘boutique’ scale and grows slowly.

GOLDFIELDS CAMEL HARVEST & SALES / DEMAND SCENARIO 2021 - 2030		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
<small>(KEY: Blue - Low Qlty Camels; Red - High Qlty Camels)</small>											
Bait Meat		300	400	500	600	600	600	600	600	600	600
GPS Tracking Program		100	-	-	50	-	-	50	-	-	-
Pet Meat		500	800	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400
Meat Meal		600	800	1,000	1,400	1,800	2,200	2,600	2,600	2,600	2,600
Holding Facility		1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Dairy		300	-	300	-	300	-	600	-	600	-
Co-Grazing (sale to Pastoralists)		-	200	-	300	-	300	-	300	-	300
Sale to WA Abattoir/Slaughter Houses		500	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Goldfields Camel Abattoir		-	-	-	3,000	3,000	3,000	4,000	4,000	4,000	8,000
ESTIMATED CAMEL SALES / DEMAND		3,300	4,200	4,800	8,550	9,100	9,700	11,650	11,500	12,000	15,900
Aboriginal Lands Harvest Target (No. Camels)		12,000	14,000	16,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
Pastoral Lands Harvest Target (No. Camels)		2,000	3,000	3,000	4,000	4,000	4,000	5,000	5,000	5,000	5,000
Annual Harvest Target - TOTAL		14,000	17,000	19,000	22,000	22,000	22,000	23,000	23,000	23,000	23,000
% of Low Qlty <u>Pastoral</u> Camels Utilised		107%	95%	119%	116%	136%	157%	144%	149%	154%	160%
% of High Qlty <u>Pastoral</u> Camels Utilised		300%	244%	256%	442%	442%	442%	440%	420%	440%	687%
% of Pastoral Harvest Allocated / Sold		165%	140%	160%	214%	228%	243%	233%	230%	240%	318%
No. Camels Required from Aborig. Lands		1,300	1,200	1,800	4,550	5,100	5,700	6,650	6,500	7,000	10,900
<small>Assumption: Majority of camels harvested from the eastern desert region, on Aboriginal lands, will be sold to SAMEX in the short-medium term.</small>											

Developing a Camel Industry in WA. A Recommended Approach

Sustainable Supply of Camels

Establish a network of self mustering yards and water isolation points (i.e. 100+ yards on pastoral and Aboriginal lands near known 'hot spots').

Establish co-grazing of cattle and camels on Pastoral Stations at the crown land interface (e.g. 10+ stations, 10+ self mustering yards each).

Establish a 'Judas' camel tracking program monitoring 150+ cows to track herd movements, aid mustering programs and forewarn of herd damage.

Establish a central holding yard with capacity for 2000 ~ 4000 camels to support adjacent micro and value-adding operations.

Value Adding

Produce bait meat for wild dog program; harvest and process 100-200 camels p.a.; WA government and RBA's as the client.

Supply slaughtered low quality camels to WA pet food sector. Establish meat meal plant and develop organic fertiliser for regenerative farms in WA.

Establish a camel dairy (400-600 camels). Milk production initially then freeze dried powdered milk. Later a mobile dairy to process cows on pastoral stations.

Establish a modular slaughter unit for pet meat. Progress facility into a food-grade export licensed abattoir.

Establish live camel export trade (for breeding, food and dairies)

Key Features

Collaboration. Pastoralists, Aboriginal Communities, Government, Industry, Community / Towns, NGO's, Universities, Buyers.

Marketing. Provenance / Industry branding, direct-to-end user online portal, premium quality product, transparency, customer focus.

Sustainability. Industry standards, quality assurance, traceability, code of practice, triple bottom line reporting.

Management. Feral camel reduction target. 10yr Govt funded regional program. Aboriginal employment focus. Pastoral diversification. New export industry. Innovative value-adding.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Recommendations

- i. Government and stakeholders adopt a long term view; pursue a minimum 10-year industry development program; that camel population reduction and camel commercialisation be viewed as complementary tasks of equal, critical importance.
- ii. Immediately develop a camel industry strategy and business case to accompany grant applications and investment proposals.
- iii. Actively pursue a 'Regional Deals' partnership through engagement with Federal and State members of parliament; aim is to better manage Australia's feral camel population and generate economic benefits for remote and regional communities across the Goldfields-Esperance.
- iv. Encourage and support private investors to form partnerships, resources and feasibilities / business plans to develop the ventures outlined in this report.
- v. Seek grant funding and investment support to establish a GPS monitoring system, a network of self mustering yards on pastoral and Aboriginal lands, and technical support to help pastoralists adopt co-grazing. Aim is to ensure the supply of camels is reliable and sustainable from the outset.
- vi. Call expressions of interest to establish a panel of experts with 'deep' experience in breeding, handling and farming of camels to provide expertise to new operators, contractors, communities, GVROC and Government.
- vii. Establish a GVROC sub-committee to facilitate grant and investment applications, coordinate and support private investors, and provide guidance to locating and developing the required infrastructure (in collaboration with the panel of experts).
- viii. Aim to appoint a commercial project manager to liaise with stakeholders and implement the industry strategy that will deliver a sustainable camel industry within ten years.
- ix. Compile a register (online library) of education / training materials for pastoralists and Aboriginal stakeholders on issues relating to camel handling, domesticating, grading (age, health, condition), transporting, breeding / farming, processing, value-adding and marketing.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Appendix

Funding

Potential grant funding schemes include:

Building Better Regions Fund

<https://www.business.gov.au/SearchResult?query=Building+Better+Regions+FundanduseAndSearch=tr ueandtype=1>

Supports infrastructure projects and community development activities.

Regional Deals

<https://www.regional.gov.au/regional/deals/>

Ten year project between Federal, State and Local Governments to facilitate community-identified projects addressing the needs of regional Australia.

Community Led Grants (Indigenous Advancement Scheme)

<https://www.niaa.gov.au/indigenous-affairs/grants-and-funding/community-led-proposals>

Supports proposals that address a need for Aboriginal and Torres Strait Islander people, developed with the community who will be impacted by and benefit from the proposed activity.

Regional Employment Trials

<https://www.business.gov.au/ret>

Provides grants to trial local approaches to delivering employment related projects, for example, helping unemployed people prepare for and find work.

Community Development Grants Programme

<https://www.regional.gov.au/regional/programs/community-development-grants.aspx>

The program supports initiatives that deliver needed infrastructure that promotes stable, secure and viable local and regional economies; that creates jobs in the delivery of projects and the ongoing use of the infrastructure.

Halal Processing Facilities in WA

Camels, live or quartered or processed into premium cuts, could potentially be supplied to the following establishments in WA.

8 Halal export abattoirs in WA:

Narrogin, Katanning, Bunbury, Cowaramup, Harvey, Derby, Beaufort River, and Myrup (Esperance).

2 Halal export Boning Rooms in WA:

Osborne Park and Malaga.

4 Halal domestic abattoirs in WA:

Australind, Gingin, Tammin, and Northam.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

8 Halal domestic boning rooms in WA:

Hamilton Hill, Kardinya, Canning Vale, Midland, Osborne Park, Hazelmere, Wangara and Canning Vale.

15 Halal butchers in WA:

Mirrabooka, Bentley, Cannington, Cloverdale, Thornlie, Girrawheen, Beechboro, Langford, Thornlie, Maddington, Morley, Huntingdale, Cannington, Jandakot and Balcatta.

source: <http://halalbooklet.com/halaldirectories.html>

Global Meat Demand and Supply Outlook

The *OECD – FAO Agricultural Outlook 2018-2027* provides an overview of the global demand, supply and prices of meat products in the medium term. Relevant highlights are presented below.

DEMAND. Growth in global demand for animal protein during 2017-2028 is projected to slow down for poultry and pig meat, but increase for beef and sheep meat. Global per capita consumption of meat will increase by 2.8kg (retail weight equivalent, r.w.e.) in developed countries and by 1.4kg in developing countries. Globally, per capita meat consumption will increase by slightly more than 1 kg r.w.e. The rise in global demand 2017-2028 will centre on beef and sheep meat.

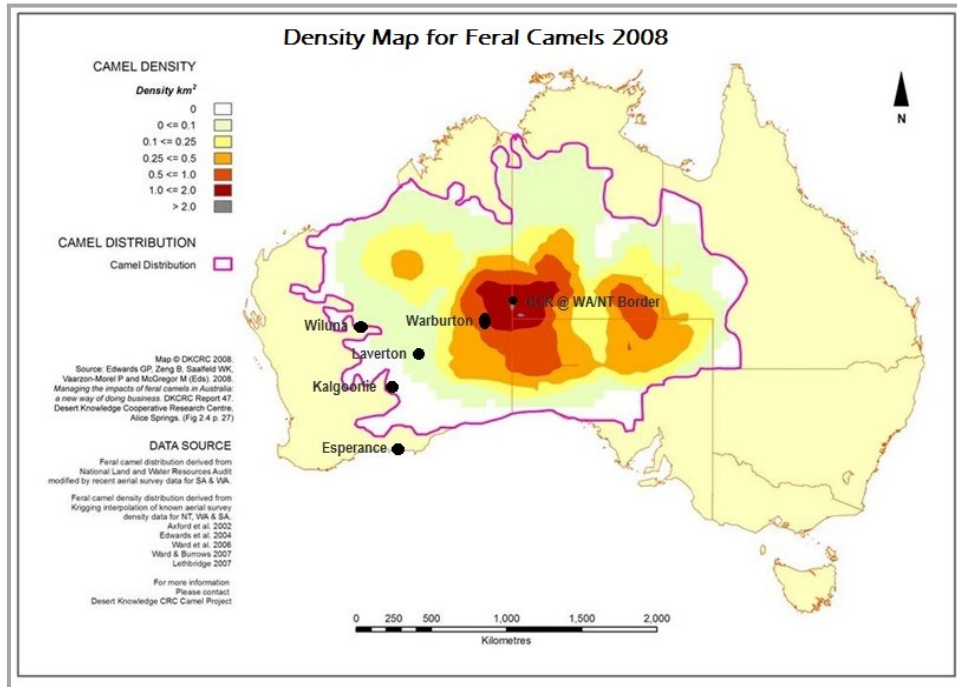
SUPPLY. In the bovine meat sector, cow herds have been rebuilt faster than expected in North America, which will lead to rising slaughter numbers and ample supply of meat on the world market for the years to 2028. In the sheep meat sector, production is expected to increase with global growth of 1.8% p.a. (i.e. higher than the previous decade). Projected production growth in developing countries remains insufficient to satisfy demand growth, particularly in Asia and Africa. Consequently, import demand is expected to remain strong throughout the outlook period (2017-2028).

PRICES. Over the medium term prices (to 2028) will strengthen as per capita meat consumption increases in developing countries, in particular Latin America and Asia; and further, as rising incomes among consumers in developing countries enables them to consume more expensive meat varieties (e.g. beef and sheep).

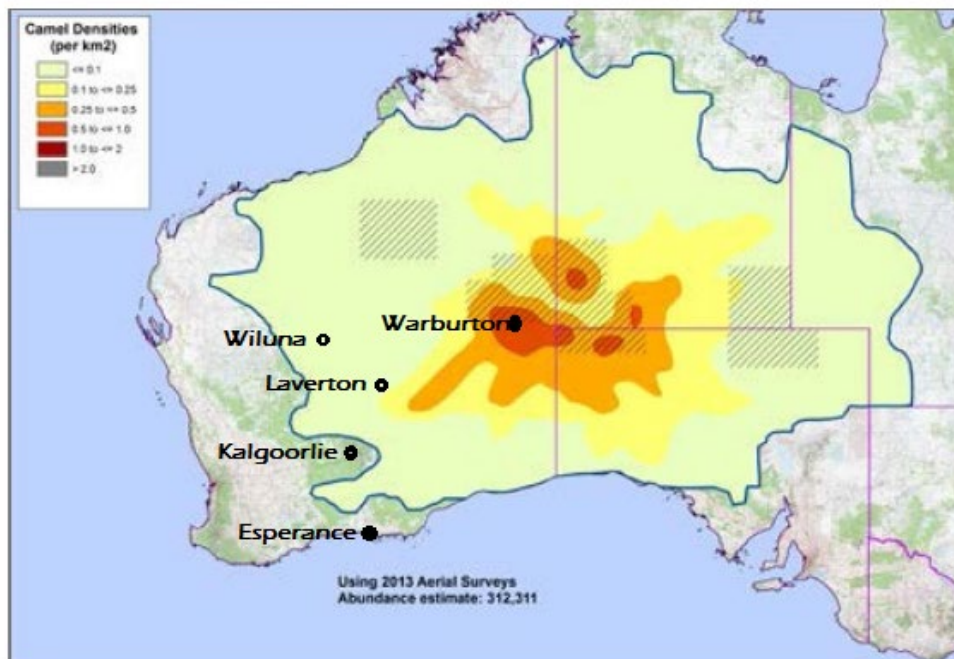
GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Camel Distribution Across Australia

The two maps shown below dated 2008 and 2013 show a migration westward of Australia's feral camel population. Implication: the Goldfields-Esperance could anticipate more camels in the short-medium term and especially in the central desert areas (e.g. the pastoral / crown land interface and on Aboriginal lands). The GPS tracking system would need to extend from Wiluna to Lake Disappointment, to Warburton, Nullarbor - Esperance and Kalgoorlie (e.g. 100 collars minimum).



Australian Feral Camel Management Program 2013 Density map for feral camels



GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Export Markets - Camel Meat

Camel Meat Market insights²⁵:

- Capacity for export growth from Australia of approximately 10,000 camels annually; further growth to around 15,000 camels beyond 3 – 5 years, but would require marketing investment.
- Small markets for processed camel meat exists in UAE, Saudi Arabia and Kuwait.
- Low demand in the Middle East and North Africa, due to a strong preference for local freshly killed camel meat (rather than pre-killed, processed, chilled and exported).
- Game meat sector in Western Europe is small and easily flooded. Highly competitive.
- Demand is firm but low in USA and Canada, paying high prices (i.e. A\$6.58/kg and A\$8.68/kg).
- High price sales in Japan at A\$11.86/kg for 2 tonne (i.e. one-off shipment).
- World prices for camel meat are generally low, around A\$4.30/kg to A\$4.50/kg.

Export Market Status & Outlook			
<small>The last column is indicative and assumes 28% of live weight is useable boxed meat with an average live weight of a camel = 524kg.</small>			
Market	Comment on market status and outlook	Likely market demand (tonne/year)	Equivalent camels
Australia	Viable market that will grow slowly over time	125	852
North America	Viable market willing to pay more than commodity prices	300	2045
Western Europe	Small game meat market with capacity to pay, some sales to the resident Muslim population	100	682
Eastern Europe	No established sales, longer term it may be prospective	0	0
Middle East	Strong preference for local freshly killed camel meat	50	3410
North Africa	Stable mature market in Morocco	900	6134
Other Asia	Unlikely that Australia could meet regional 'Malesia' halal certification requirements. Small test market explored in Japan with high prices received	0	0
China	Potential market but legal market access and promotion required. Small sales into Hong Kong may be possible	0	0
Total			10,053

Source: Central Australian Commercial Camel Meat Viability Study. 2016. Agriknowledge & AgEcon Plus. P.57

²⁵ Central Australian Commercial Camel Meat Viability Study. 2016. Agriknowledge and Ag Econ Plus. P. 57-58.

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Viability Analysis

For comparative purposes a 'worst case' scenario was applied to the viability assessment of the six proposed camel ventures. Sales were reduced to 65% of 'design' capacity and expenses were reduced to 85%, representing a 'worst case' scenario, as shown below. The self-mustering yards and the abattoir remain sustainable in the short term. The holding facility and meat meal ventures are the most vulnerable under this scenario, followed by the Bait Meat and Dairy ventures. If the scenario was sustained beyond 6-12 months the ventures would typically require additional working capital (e.g. overdraft, commercial / personal loan, equity injection or restructuring). In reality, the ventures would usually respond by quickly reducing operating hours along with staffing and variable costs until production improves nearer to 100%. In the event of camels migrating away from traps and supply temporarily dwindling, the holding yard, co-grazing and 'Judas' monitoring network would be expected to provide a near-steady supply of camels for the short term (e.g. 6-12 months) to help sustain operations within the camel ventures.

Scenario: Worst Case	Meat Meal	Abattoir	Bait Meat	Dairy	(20) Self Mustering Yards	Holding Facility	Total
No. Camels p.a.	600	3000	400	300	600	1000	5900
Capex	\$264,000	\$4,564,000	\$170,000	\$690,000	\$560,000	\$750,000	\$6,998,000
Sales	\$95,550	\$1,862,250	\$273,000	\$709,800	\$104,000	\$585,000	\$3,629,600
Expenses	\$106,250	\$1,819,000	\$306,000	\$731,000	\$70,000	\$680,000	\$3,712,250
Profit / Loss (EBITDA)	-\$10,700	\$43,250	-\$33,000	-\$21,200	\$34,000	-\$95,000	-\$82,650
Profit / Loss (pre-tax)	-\$45,020	-\$550,070	-\$55,100	-\$111,200	-\$38,800	-\$192,500	-\$992,690
Benefit : Cost	-1.8	-0.8	-4.9	-1.6	0.2	-3.5	
NPV (20yrs, 8%)	-\$105,054	\$424,635	-\$323,999	-\$208,145	\$333,817	-\$932,724	
Payback Period (yrs)	-25	106	-5	-33	16	-8	
No. Jobs (direct)	1	7	2	4	0.5	2	16.5
No. Jobs (indirect)	3.9	27	8	16	2	8	64.4
Total Benefit p.a.	\$277,095	\$5,400,525	\$791,700	\$2,058,420	\$301,600	\$1,696,500	\$10,525,840

Miscellaneous Facts and Figures

- Mustering on APY lands yielded an average \$100 revenue per camel, costs totalled \$85, margin \$15, AFCMP paid a further \$78 per female. Mustering on CLC lands yielded \$100 revenue per camel, direct costs before wages were \$102, direct loss \$2 per camel. AFCMP concluded camel mustering is a marginal activity. Mustering was ineffective in reducing populations compared to aerial shooting (e.g. 50 per day compared to 1000 per day). AFCMP Final report, 2013, p.95 Dressed weight min. 100kg to max. 210kg, avg. 150kg (i.e. food grade meat recovered); Average wholesale price \$3.03/kg or \$503 per camel. Source: *A feasibility study of mobile abattoir opportunities to service the Northern Territory and northern region of Western Australia*. 2010. By G.Niethe and G. Butler. Abattoirs with export facilities incur significant additional expenses including inspection costs (up to \$200,000 p.a.), and higher capital costs (e.g. staff amenities, extra chiller and freezer facilities, up to \$350,000). Exports are not recommended until significant scale is achieved to cover the extra cost burden of export compliance. Personal communication June 2020 Stocking rates for cattle in WA range between 1-3 adult equivalent cattle per one

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

square kilometre (e.g. 100 hectares). Studies have shown 1 camel to 300 hectares presents no ecological change. Cattle grazing on salt bush require 70-140 litres of water per day. Camels grazing on similar vegetation require 30-40 litres of water per day. Cattle lose 20-40 litres of fluid daily through faeces; camels lose 1.3 litres daily through faeces. Port Pirie, South Australia, a proposed \$60.0M multi-species export licensed abattoir is scheduled for commissioning late 2020, majority owned by Pirie Meats Co. Design capacity is 3000 small stock and 300 large stock per 8hr shift. The facility would be equipped to process camels and would likely become a buyer of live camels from Central Australia.

- In 2013, AFCMP estimated there were 312,000 feral camels in Central Australia. WA was estimated to have up to 60% of the feral camel population (i.e. 187,000 camels). However, this estimate could have been + / - 25% of WA's actual population (i.e. from as low as 140,000 up to 234,000). Natural growth in WA's camel population is conservatively estimated at 5% p.a. (i.e. could be as high 7% - 10% p.a. some years).²⁶ The harvest rate during 2020 to 2030 could significantly reduce the feral population or allow it to increase, as shown below.

ESTIMATED FERAL CAMEL POPULATION in WA at 2030				
SCENARIO	2013	2020	5% p.a. Natural Growth at 2020	2030 Pop'n with Harvest Target 20,000 p.a.
HIGH	234,000	329,000	16,450	344,000
MEDIUM	187,000	263,000	13,150	236,000
LOW	140,000	197,000	9,850	130,000

Key Success Factors

A range of key success factors have been identified as potentially critical components in developing a sustainable camel industry in the Goldfields-Esperance, including:

- Quality and Environmental Assurance, and triple bottom line reporting, should be developed gradually over time.
- Code of practice (farm to fork; through chain integrity).
- Training facilitators (i.e. train-the-trainer programs and on-the-job training programs).
- Panel of camel experts (i.e. skill and expertise based).
- Industry and regional branding; to reinforce provenance, organic qualities, safe food.
- Independent entity to source and manage industry development grants.
- R&D partnerships, programs and innovative projects (e.g. pilot and micro ventures).
- Effective management of intellectual property (IP), data and know-how.
- Distinctly customer-focused in marketing, sales, products and ventures (e.g. through research and direct engagement with end users / consumers).

²⁶ Refer to footnote 3, page 5

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

References

In chronological order.

Economic Analysis Of Meat Processing Options On Kangaroo Island. A Report to Primary Industries and Regions SA and Livestock SA. Prepared by BDO EconSearch. 2019

The Feasibility of Establishing Further Meat Processing Capacity in Tasmania. Final Study Report. Stephens, M; Malcolm, B. Herrmann, R; Scott B and P. Blackshaw. 2019

Camel Commercialisation in the Goldfields-Esperance Region of Western Australia: An exploratory scoping review. Hanslow-Sells. E., Perry. D., Carey. L. B., Krikheli. L., Drakopoulos. T., Heath. A., Vargas. C. Melbourne: La Trobe University. 2019

Managing Camels in Dry Times. Ngaanyatjarra Camel Company. Annual Report. 2019

Release of Indospicine from Contaminated Camel Meat following Cooking and Simulated Gastrointestinal Digestion: Implications for Human Consumption. Sultan et al. 2018.

Beneficial Enterprises. Discussion Paper. Department of Local Government, Sport and Cultural Industries. 2018

Multispecies Livestock Transshipping Hub: Improving safety, efficiency and profitability in the Australian Livestock Industry. Prepared on behalf of the Outback Communities Authority and Regional Development Australia Far North. 2018

OECD-FAO Agricultural Outlook 2018-2027. Chapter 6 – Meat. OECD and FAO. 2018

Feasibility of manufacture and investigation of physicochemical properties of camel milk – based ice cream. Afshin Jafarpour, Journal of Scientific Agriculture 2017

Facilitating feral camel removal in Australia through commercial use. J.G. Virtue, P.D. Gee, N.M. Secomb, P.R. O’Leary and B.P. Grear. Rangelands Journal. 2016.

Central Australian Commercial Camel Meat Viability Study: Report to the Northern Territory and South Australian governments. L. Andrews, M. Clarke, M. Lethbridge, J. Sobels. AgEconPlus Consulting. 2015.

The Feasibility of Developing Camel Abattoirs in Central Australia: A Contemporary Desktop Economic Analysis For Establishing A Camel Abattoir in The South West Region Of The Northern Territory. Department of Primary Industries and Fisheries. Northern Territory. 2015

A Micro-Abattoir On Great Barrier Island. A Feasibility Study To Consider Supply, Demand And Future Directions. AoteaOra Community Trust. New Zealand. 2015

Camel Live Export Supply Chain and Benefit Cost Analysis. Michael Clarke, AgEconPlus Consulting for MLA. 2014.

Strategic Report. Impact Assessments for Vertebrate Pests in Western Australia. D.C. Cook. Department of Agriculture and Food WA. 2014

Large Feral Herbivore (LFH) Management Plan 2014-2019. Goldfields-Esperance Nullarbor Rangelands Biosecurity Association. 2014

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Managing the Impacts of Feral Camels Across Remote Australia. McGregor M, Hart Q, Bubb A, and Davies R. 2013.

Managing The Impacts Of Feral Camels Across Remote Australia: Final Report of the Australian Feral Camel Management Project. 2013

Best Practice Camel Book. An illustrated guide to the 2012 Australian Standard, Model Code of Practice and Standard Operating Procedures relevant to the humane control of feral camels. Edited by: M Feldmuller, P Gee, J Pitt and L Feuerherdt. 2012

Australian Camel Meat: China Market. Rural Industries Research and Development Corporation. 2011.

A feasibility study of mobile abattoir opportunities to service the Northern Territory and northern region of Western Australia. G. Niethe and G Butler. For Northern Territory Government and WA Department of Agriculture and Food. 2010.

Evaluation of the impacts of feral camels. G. Edwards, B. Zeng, W. Saalfeld and P. Vaarzon-Morel. The Rangeland Journal, Vol 32. 2010.

Mobile Processing Systems for the Australian Livestock Industry. A Coppin. International Specialised Skills Institute. 2010

Review of commercial options for management of feral camels. Zeng and McGregor. 2008.

Managing the impacts of feral camels in Australia: A new way of doing business. Edited by GP Edwards, B Zeng, WK Saalfeld, P Vaarzon-Morel and M McGregor. Report 47. 2008

Composition of New Meats. Analysis and nutrient composition of innovative meat industries.

Shane Beilken, Ian Eustace and Ron Tume Food Science Australia for the Rural Industries Research and Development Corporation. 2007.

Export Markets for Skins and Leather for Australia's camel, crocodile, emu and goat industries.

B Goulding, E Riedel, A Bevan, B Warfield for the Rural Industries Research and Development Corporation. 2007.

The Northern Territory Camel Industry at the Crossroads. Prepared by David McKinna et al, for Central Australian Camel Industry Association. 2005.

Development of Camel Industries in Western Australia, Discussion Paper. R Rouda. Department of Agriculture WA. 2003

Code of practice for camels in Western Australia. Department of Local Government and Regional Development, Western Australia. 2003

Buffalo, Camel, Crocodile, Emu, Kangaroo, Ostrich and Rabbit Meat: New value added products.

J Bobbitt for the Rural Industries Research and Development Corporation. 2003.

Co-Grazing Cattle And Camels. A report for the Rural Industries Research and Development Corporation. A Phillips, J Heucke, B Döriges, and G O'Reilly. 2001

GOLDFIELDS-ESPERANCE CAMEL INDUSTRY ANALYSIS

Assessing the potential for a Commercial Camel Industry in Western Australia. A report for the Rural Industries Research and Development Corporation by L McCloy and P Rowe. 2000.

Marketing Analysis and Plan for the Camel Industry. B Warfield, L Tume for Rural Industries Research and Development Corporation. 2000

Development of a Sustainable Camel Industry A compilation of two reports. Rural Industries Research and Development Corporation. Part 1 – WA by K Ellard, Agriculture WA. Part 2 – Northern Territory by P Seidel, Arid Zone Research Institute. 2000

A separate report on literature review findings was prepared and submitted during the interim stages of this study.