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SHEA

THE $40M DIVERSIFICATION OPPORTUNITY IN NORTH WEST QUEENSLAND

FINAL REPORT; v1.03; December 2018

CORIOLIS

Queensland Government

QUEENSLAND GOVERNMENT
Department of Agriculture and Fisheries

SHEA

The $40m diversification opportunity in North West Queensland

FINAL REPORT

December 2018

V1.02

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This research on agricultural diversification opportunities emerged from the Strategic Blueprint for North West Queensland

Strategic priority 2:
Diversifying the regional economy and creating employment opportunities

The Province has a strong regional economy built predominantly on mining and minerals processing. The Queensland Government is committed to maximising commercially viable economic development and job creation opportunities for the Province by adopting a whole-of-government diversification approach, with additional funding of almost $5.5 million over four years for initiatives within this strategic blueprint priority.

Key actions to be delivered in developing the strategy include:

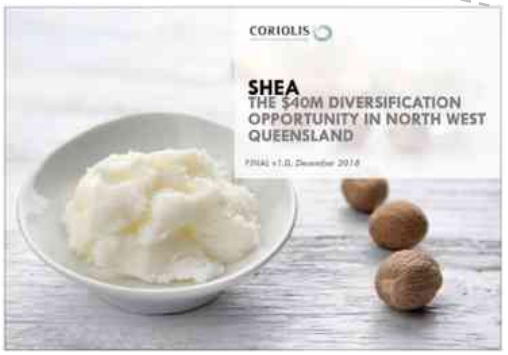
- **Scope opportunities for increasing agricultural production**

  The state's North West presents unique prospects for further agricultural development. In recognising these opportunities across the Province, the Queensland Government will be developing an integrated North West Queensland agriculture plan. The plan will focus on continuing to grow a sustainable and diversified agricultural sector, and will be developed in collaboration with key stakeholders across the supply chain and linked with the broader regional economic diversification strategy.

Source: "A Strategic Blueprint for Queensland's North West Minerals Province; Supporting Strong And Prosperous Regional Communities", Queensland Government

Shea is one of 20 identified high potential products that both fit regional conditions and have large and attractive global markets

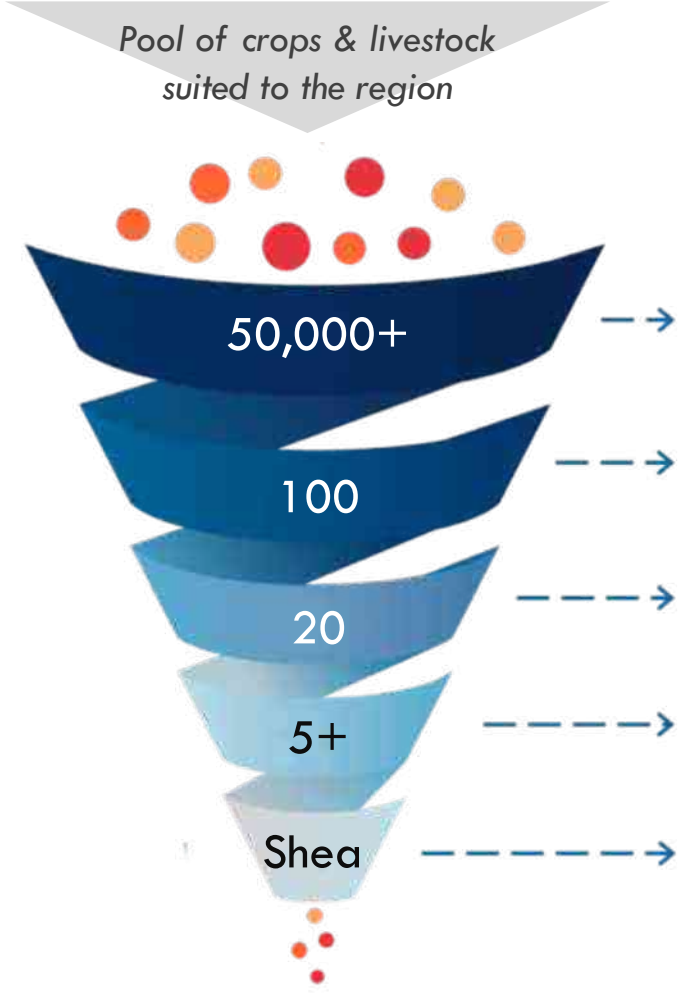
FOCUS OF THIS PROJECT



Source: Coriolis analysis

Shea emerged from a multi-stage screening process as a star product with high growth potential

See related research for details of screening process



50,000+	*Hypothetical Universe*	All plants and animals ever farmed by humans in some way
100	*Existing or Potential*	Products identified as potentially having merit in the region
20	*Solid Opportunities*	High potential products with robust demand
5+	*Potentially Transformative*	Products that could potentially transform agriculture in the region
Shea	*Profiled in this Document*	

Source: Coriolis analysis

Executive Summary

THE NORTH WEST QUEENSLAND OPPORTUNITY

North West Queensland is a massive region with huge untapped potential for agricultural growth. It is the size of Japan or Germany, with the population of the City State of Monaco. African climatic peers currently produce 10 times as much food per hectare.

This report forms part of a wider body of research designed to identify opportunities for increasing and diversifying agricultural production in the North West Queensland region. The research identifies high potential products that both fit regional conditions and have large and attractive global markets. Shea emerged from a multi-stage screening process as a star product with high growth potential.

WHAT IS SHEA? WHERE IS IT PRODUCED?

Shea (typically pronounced "shee" or "shay") is a Sub-Saharan African tree. Shea is highly drought tolerant tree originated in dry savannah of Africa, a region which has the same climate as North West Queensland. The nuts of the shea tree are rich in oils and fats that are extracted as shea butter.

Shea produces an economic tree crop in regions of the tropical savannah where little else will grow.

Shea trees almost exclusively grown in the hot, dry savannah of the Sahel region of Africa; therefore Sub-Saharan Africa controls global shea production. However, there are numerous challenges to maintaining current shea production shea in Africa, let alone producing more

Five countries – Nigeria, Mali, Burkina Faso, Ghana & Ivory Coast – account for 91% of commercial shea nut production. However, global shea production appears to have stalled for supply – not demand – reasons. The current global shea supply is inconsistent, creating an opportunity for a reliable country like Australia to enter the market.

WHAT & WHERE IS THE MARKET FOR SHEA?

Shea – both butter and nuts – is a US$152m global market, growing at 14% per year, on the back of high demand. The key markets for raw shea nuts and butter is Europe and Malaysia, but recent growth has also come from other markets.

Shea is used for its functional benefits across three key categories: (1) chocolate, (2) health & beauty and (3) other foods.

- First, chocolate is the largest user of processed shea butter, accounting for 80-85% of globally traded volume. Shea butter is used in "cocoa butter equivalents" (CBE) and global demand for these is growing. As a result, The price of shea butter moves in line with the price of cocoa butter, though at a significant discount

- Second, the health & beauty industry is a major uses or shea butter, accounting for 10-15% of globally traded volume. As a simple example of its popularity and widespread use, shea is a listed ingredient in over sixty health and beauty products currently stocked by Woolworths in Australia.

- Finally, there are a wide range of other ingredient and nutraceutical uses for shea butter, accounting in total for 5-10% of globally traded volume.

Macro drivers are pushing growth in global shea trade volume and value. Demand is growing faster than supply increasing value.

Executive Summary

THE $40m SHEA OPPORTUNITY FOR NORTH WEST QUEENSLAND

NW Queensland is ideally positioned to supply the growing demand for shea, it is "the right place to grow", close to key markets in Asia and is a safe and trusted supplier of food to the global market. Only NW Queensland can deliver a region that combines a modern, developed economy with African climatic conditions.

The addressable market for Australian shea is estimated at A$40m+ across four broad market segments.

- First, minimally processed shea butter products can be produced in small volumes and sold locally and regionally.
- Second, Australian produced shea will find a ready market with Australian cosmetics and beauty product producers and marketers.
- Third, larger multinationals will welcome shea butter made from trusted, efficient and sustainable Australian ingredients.
- Finally, Australian shea butter can be sold into the world market at world prices.

Realising the NW Queensland shea opportunity will require investment across four broad development themes. Developing shea requires land and water ("best location"), the best available genetics ("proven genetics"), systems optimised to local conditions ("efficient systems"), and selling the product to key markets ("targeted market").

WHAT IS IT?
WHERE IS IT PRODUCED?

01

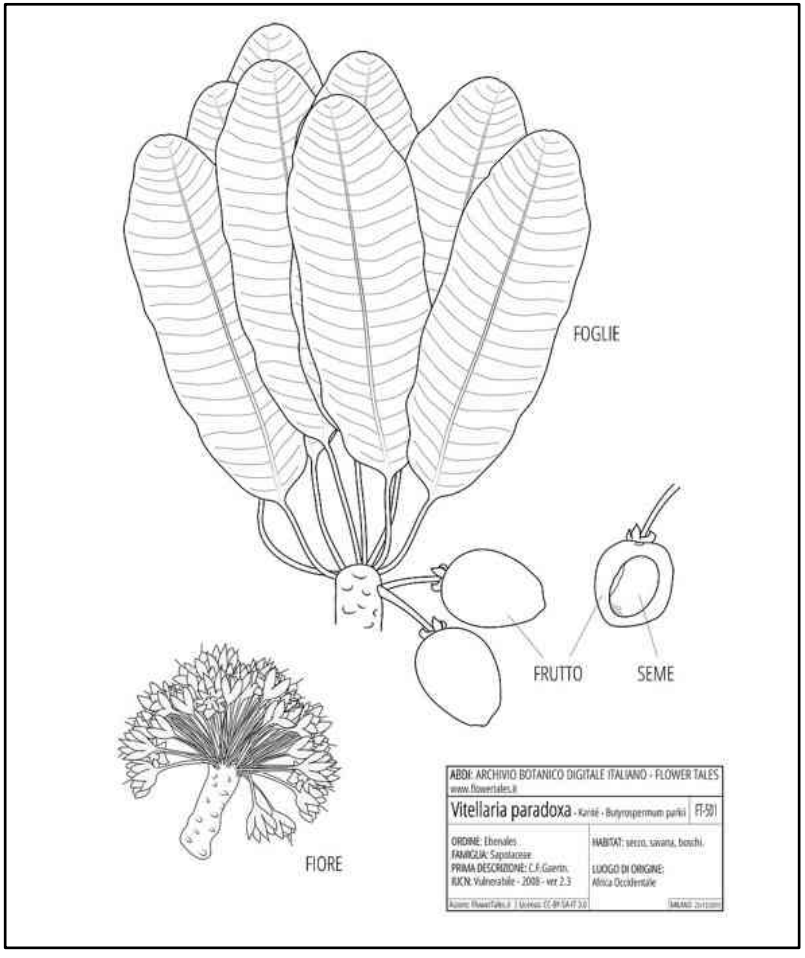
+ Product

+ Producing countries

Shea trees produce shea nuts, which are one of the few major cash crops of the dry savannah of Sub-Saharan African

- Shea is an African tree valued for its oil rich nut
- Shea is adapted to the dry savannah of Sub-Saharan Africa, a region which has the same climate as North West Queensland
  - Shea grows naturally across twenty one countries in the Sahel region of Africa
  - Two varieties of shea exist: the western variety produces hard fats while the eastern variety produces liquid oils
  - North West Queensland has the exact same climatic conditions as the shea tree zone
- Shea produces an economic tree crop in regions of the tropical savannah where little else will grow

Shea is an African tree valued for its oil rich nut



Common names	Arabic (lulu); Dioula (Shi); English (sheanut tree, shea tree); French (karité); Fula (balire, kareje); Hausa (man ka'dai); Igbo (okwuma); Spanish (tango); Temne (an-doni); Yoruba (akú malapa)
Scientific name	*Vitellaria paradoxa (formerly* Butyrospermum parkii)
Type of plant	Tree of the *Sapotaceae* family; thin, tart nutritious pulp of the fruit surrounds a relatively large, oil rich seed
Cultivation cycle	Deciduous; usually 7-15m tall; first bearings at 7-15yrs, full production at 20-30yrs; produces nuts for up to 200 years
Suited climate	Dry savannah; 400-1,400mm rainfall/year
Uses	Shea butter (made from the nut) has a range of uses, including in food and skin care (as an emollient); 90% of exported shea butter used in food industry as a cocoa butter substitute
Origin	Indigenous to Africa; traditional food plant
Established in AU	No apparent introduction yet

Source: various published articles and websites; Coriolis analysis. Photo credit: ABDI - Archivio Botanico Digitale Italiano; CC-BY-SA-3.0

Shea is adapted to the dry savannah of Sub-Saharan Africa, a region which has the same climate as North West Queensland

- Highly adapted to "extreme weather conditions"
- Extensive root system; can survive 5-7 month dry season
- Bark conspicuously thick, corky, horizontally and longitudinally deeply fissured; protects trees against bush fires; can survive severe fires
- Usually cross-pollinated by insects, but can be self-pollinated
- Flowering lasts 30-75 days and the fruit takes 4-6 months to develop, reaching maturity early in the rainy season
- Grows at altitudes between 100-1,200m
- Prefers a mean annual temperature of 24-32 deg C and mean annual rainfall of 400-1,400mm
- Prefers dry and sandy clay soils with a good humus cover but also tolerates stony sites and lateritic subsoil although reacting with lower yields; avoids swampy areas and those prone to flooding

Source: WorldAgroforestry.org; various publications and articles; CC BY-NC-ND 2.0 (CIFOR); Coriolis analysis

Shea grows naturally across twenty one countries in the Sahel region of Africa

TOP 21 GLOBAL SHEA PRODUCING COUNTRIES

By total production volume; 2016

Source: UN FAOSTAT; Global Shea Alliance; Coriolis analysis

Two varieties of shea exist: the western variety produces hard fats while the eastern variety produces liquid oils

TWO IDENTIFIED VARIETIES OF SHEA

Model; 2018

WESTERN ("Paradoxica")

Higher stearic acid (saturated fatty acids)
Produces a solid, harder butter at ambient air temperature

Ghana
Burkina Faso
Benin
Cote D'Ivoire
Togo
Nigeria
Niger

EASTERN ("Nilotica")

Higher oleic acid (unsaturated fatty acid)
Produces liquid fat

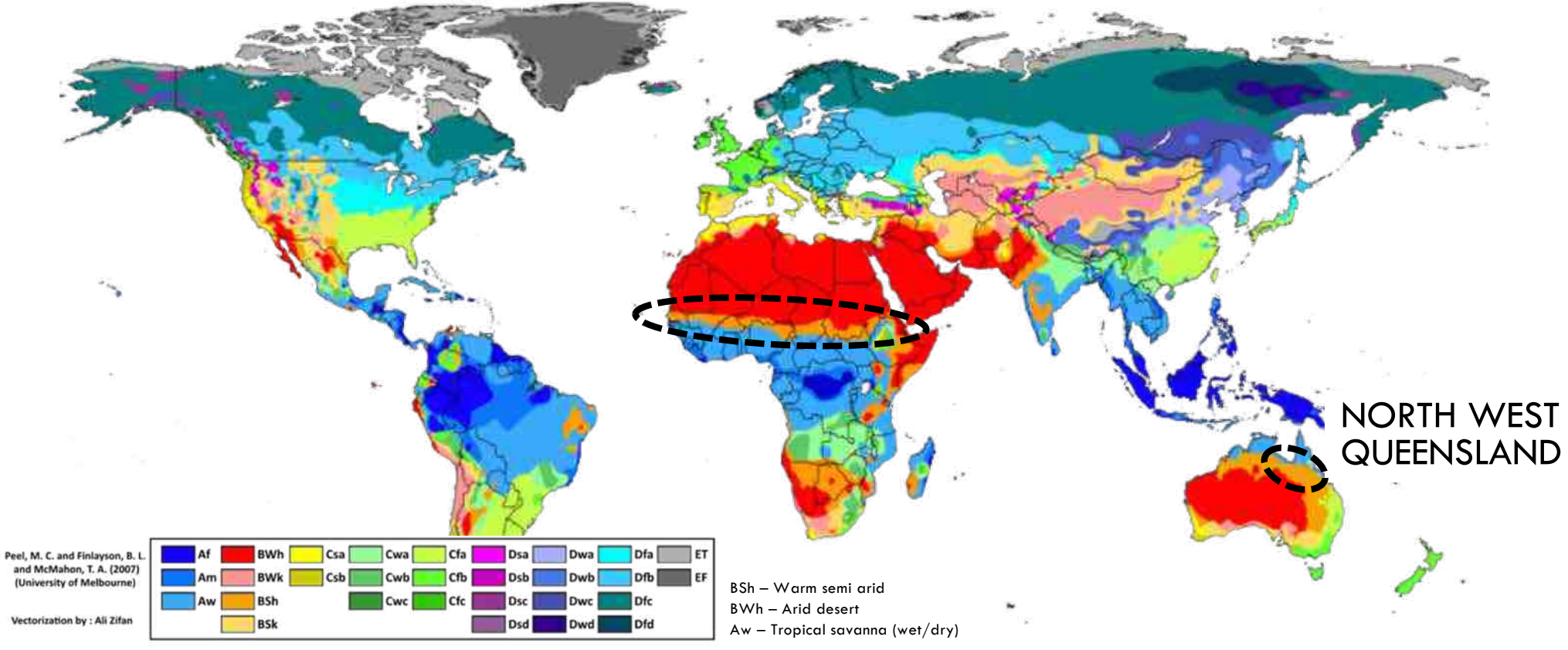
Cameroon
Chad
Central African Republic
Uganda

Source: https://www.cirad.fr/en/our-research/research-results/2010/evolutionary-history-of-the-shea-tree

North West Queensland has the exact same climatic conditions as the shea tree zone

CLIMATIC ZONES OF THE WORLD AND SHEA PRODUCTION CLIMATE

Koppen-Geiger Classification; by total production volume; 2016



Source: WikiCommons CC BY-SA 4.0 (By Peel, M. C., Finlayson, B. L., and McMahon, T. A.(University of Melbourne); Vectorized by Ali Zifan. - Hydrology and Earth System Sciences: "Updated world map of the Köppen-Geiger climate classification"; CC BY-SA 4.0); adapted by Coriolis; Coriolis analysis

Shea produces an economic tree crop in regions of the tropical savannah where little else will grow

- "Traditionally, the large and treasured shea butter tree provided the primary edible vegetable fat to peoples inhabiting a vast tract of wooded grassland that is **vulnerable to some of the worst droughts of the arable world.** It is often the only tree allowed to grow through its allotted lifespan, 400 years or more… For all its international obscurity, shea is clearly very important. It is often **the principal economic resource over extensive areas where little else saleable can be found or grown.**" *Lost Crops of Africa, 2006*

Shea butter is made from shea nuts

- The shea tree produces a fruit ("shea fruit"), the nut of which is made into shea butter
  - Dry shea kernels are produced from shea fruit in a relatively simple multi-stage process, with some regional variation
  - About 2m tonnes of shea fruit produce 718kt of nuts, which in turn produces 249kt of shea butter
- The key marketable component of shea nuts is their butter (oil/fat), which make up ~20% of fresh weight (~33% of dry)
  - Shea butter is either (1) processed at small scale and used locally in Africa or (2) processed at industrial scale for major markets
  - Shea nuts are processed into shea butter, both in Africa and elsewhere
  - The percent of shea nuts processed in Africa – at least to a crude butter stage – is increasing
- Industrial processed shea butter, like all vegetable oils, goes through a multi stage refining and fractionating process
  - A handful of large firms dominate shea processing globally and shea is an important ingredient in the major oil and fat processors portfolios
  - These firms demand sustainability and traceability from their shea supply chain
  - However, shea butter is a minor global oil and fat overall

The shea tree produces a fruit ("shea fruit"), the nut of which is made into shea butter

TREE

- Excellent quality firewood
- Termite resistant
- Can be used for timber
- Produces large quantities of nectar and pollen for bees
- Grows in low rainfall areas unsuited for oil palm
- Can be intercropped with cereals
- Provides organic matter to soil and prevents erosion

FRESH FRUIT

- 50-80% of whole fruit
- Sugary pulp; ferments quickly
- Can be eaten by humans, either raw or cooked, but no major trade exists
- Pulp and nuts can be fed to livestock and poultry
- Pigs and sheep will eat fallen fruit from ground

WHOLE NUT

- Fruit pulp removed by hand in Africa
- Nuts typically heated to loosen kernels in shell
- Cracked with two stones or machinery
- Processed into unrefined shea butter for local use or export
- Kernels exported

SHEA BUTTER

- Tasteless and odourless
- Widely used as a vegetable fat in cooking across the region
- Refined fat sold as baking fat, margarine and spreads
- Used as cocoa butter substitute in chocolate
- Used in cosmetics, both traditional and modern
- Medicinal uses

Dry shea kernels are produced from shea fruit in a relatively simple multi-stage process, with some regional variation

TRADITIONAL METHODS OF SHEA KERNEL PRODUCTION IN AFRICA

Model; 2005

	Accumulate	Heating	Sun-Drying	De-Husking	Final Drying	Storage	
West African "Boil" Method	Harvest and heap in piles	Nuts boiled	Sun-drying of nuts for 3-5 days	Manual cracking (sticks or stones) and winnowing	Sun-drying of kernels for 10-20 days (avoid rain)	Stored in jute sacks or traditional granaries	Nuts Available for Commercial Sale
West African "Oven" Method	Harvest and store in pits or piles	Nuts roasted /smoked in ovens	→	→	→	Often stored in traditional granaries	
East African "Raw" Method	Harvest	→	Immediate sun-drying of whole nuts	Manual cracking (sticks or stones) and winnowing	Sun-drying of kernels	Stored in baskets or traditional granaries	

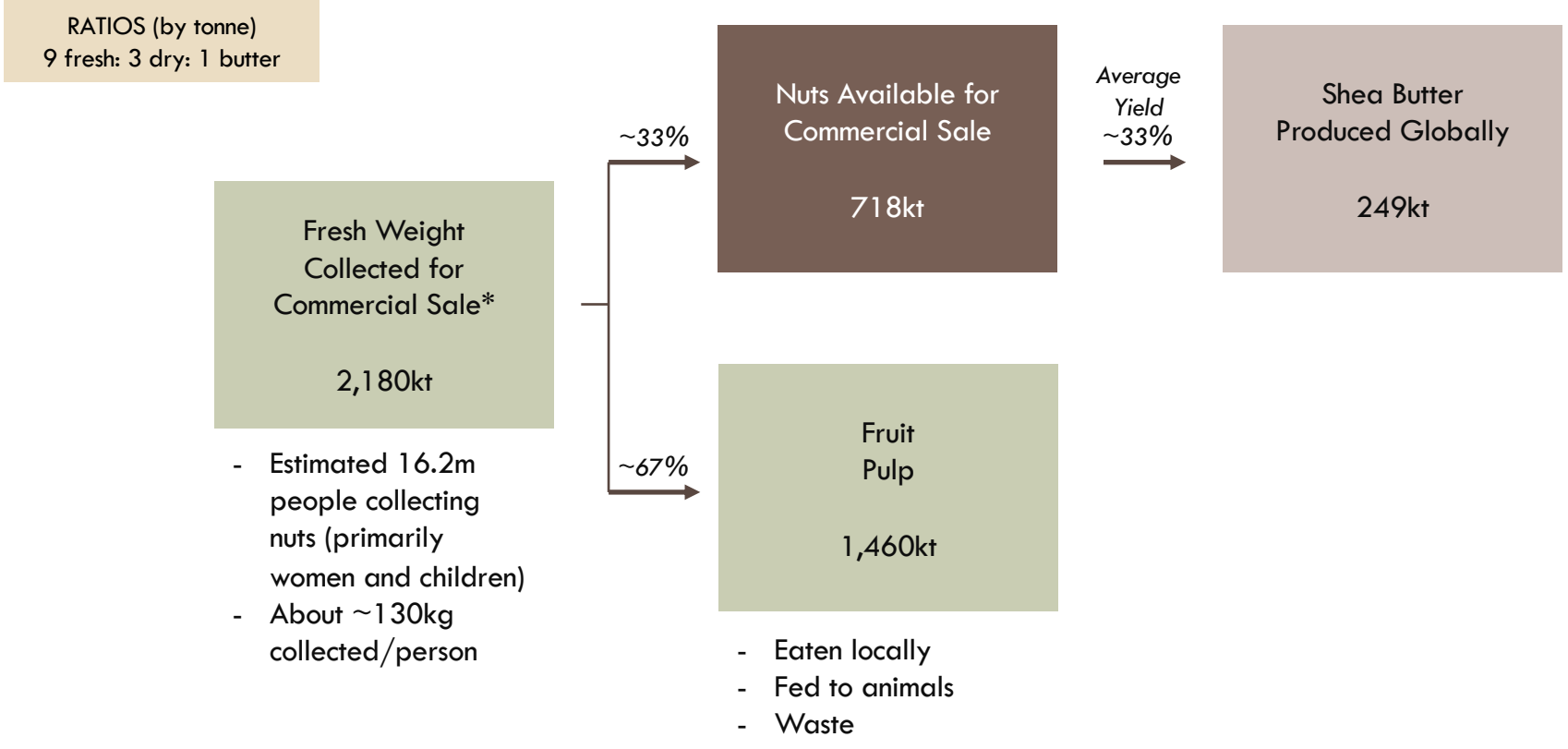
PREFERRED BY EUROPEAN PROCESSORS

Source: Dr. Peter Lovett, USAID "The Shea Butter Value Chain"; Coriolis analysis

About 2m tonnes of shea fruit produce 718kt of nuts, which in turn produces 249kt of shea butter

SIMPLIFIED MODEL OF GLOBAL SHEA BUTTER PRODUCTION

Tonnes; 000; 2016

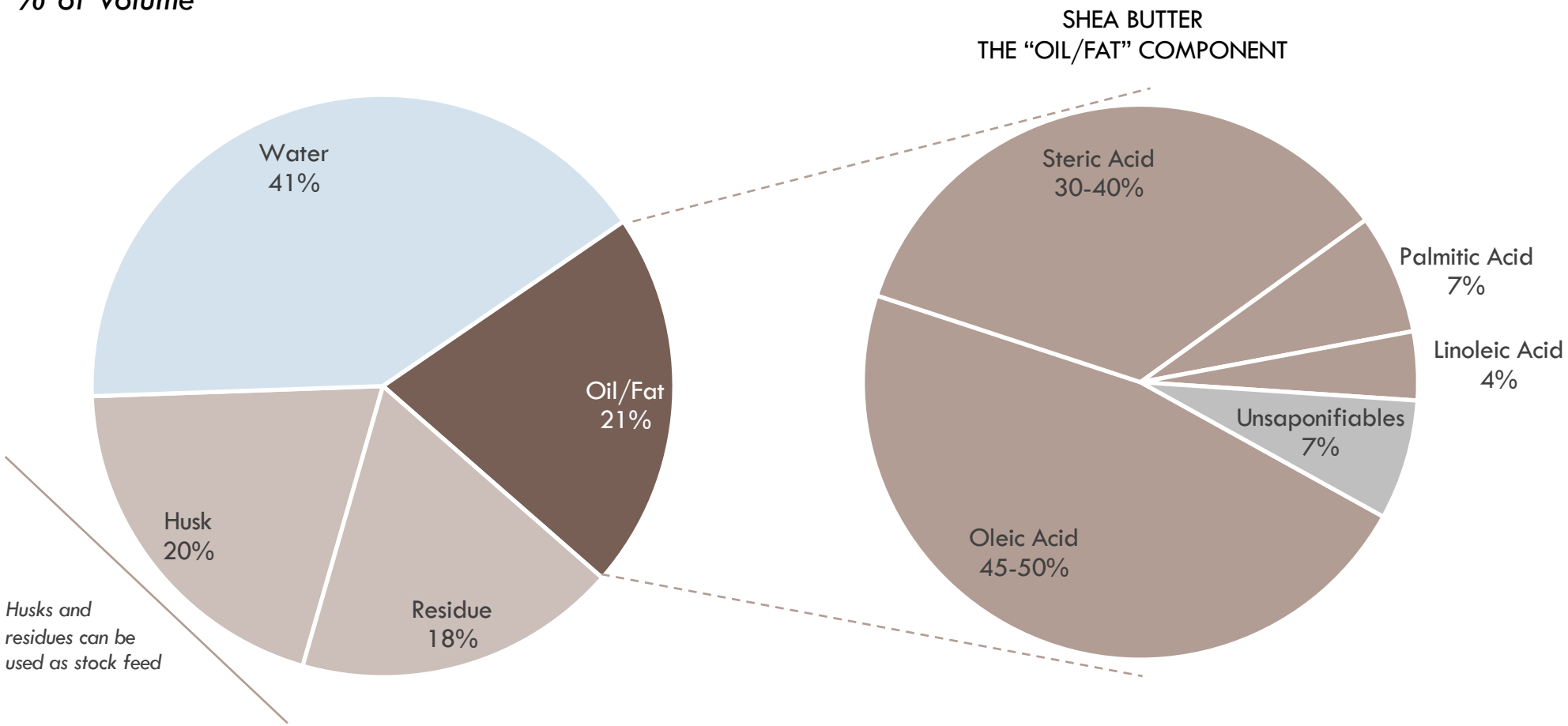


** Excludes non-commercial quantities collected and consumed at local village level. Source: Coriolis model based on a wide range of sources*

The key marketable component of shea nuts is their butter (oil/fat), which make up ~20% of fresh weight (~33% of dry)

COMPOSITION OF WHOLE FRESH SHEA NUTS

% of volume



Source: Dr. Peter Lovett, USAID "The Shea Butter Value Chain"; various other published reports and articles; Coriolis analysis

Shea butter is either (1) processed at small scale and used locally in Africa or (2) processed at industrial scale for major markets

LOCAL PROCESSING

Done at house or village level

Long history of traditional use
Low technology, rock-based processing systems
High levels of product variability
Used in cooking and skin care in Africa
Sold in local markets
Small amounts exported as fair trade "photo op" products

INDUSTRIAL PROCESSING

Historically in Europe; now crude processing primarily done in Africa

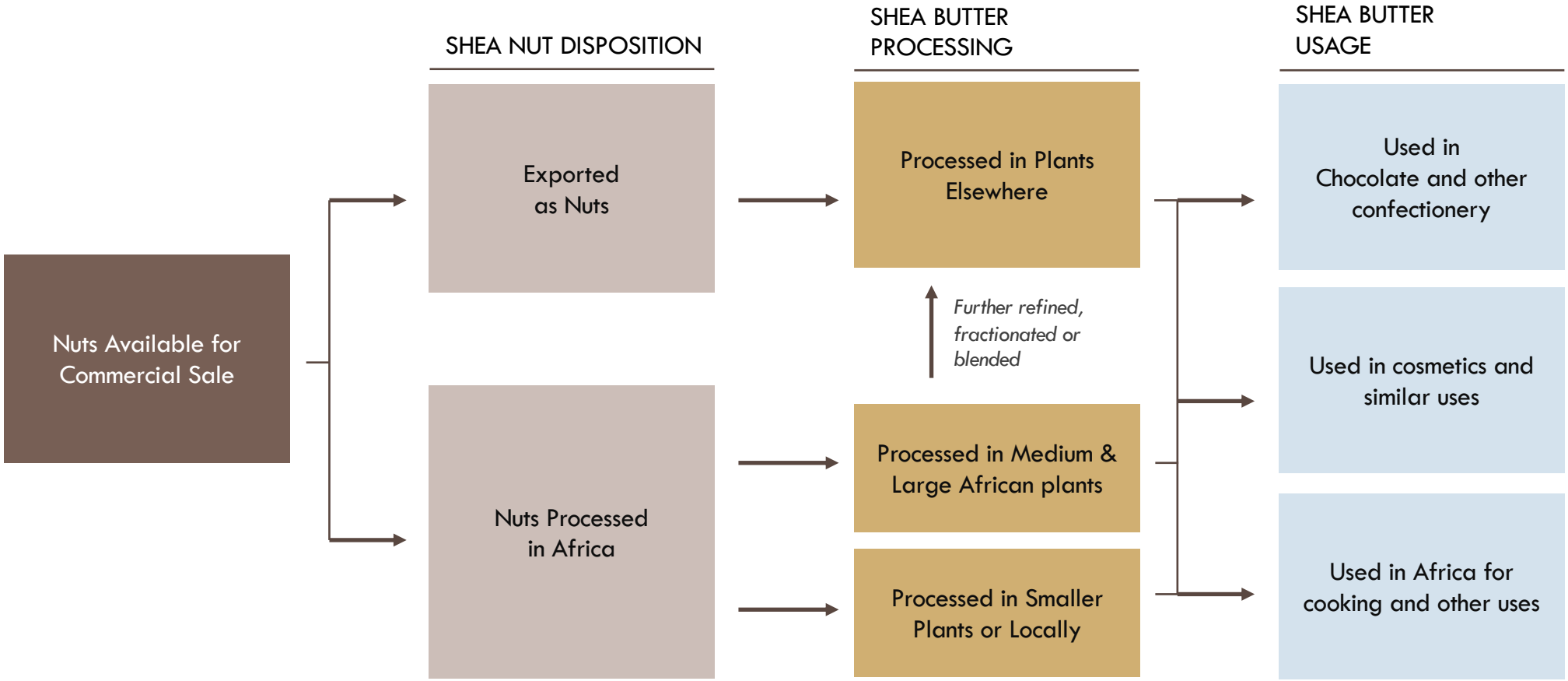
Four major global firms
Processed in very large factories in Africa and elsewhere
Refined and fractionated
Blended with various other oils and fats
Strong quality controls and systems
On-sold to confectionery, food and cosmetics firms

Photo credit: CC A 20. G (Treeaid); CC BY-SA 3.0 (Entheta)

Shea nuts are processed into shea butter, both in Africa and elsewhere; shea butter is used in chocolate, cosmetics and cooking

SIMPLIFIED MODEL OF GLOBAL SHEA BUTTER PRODUCTION AND USAGE

2018

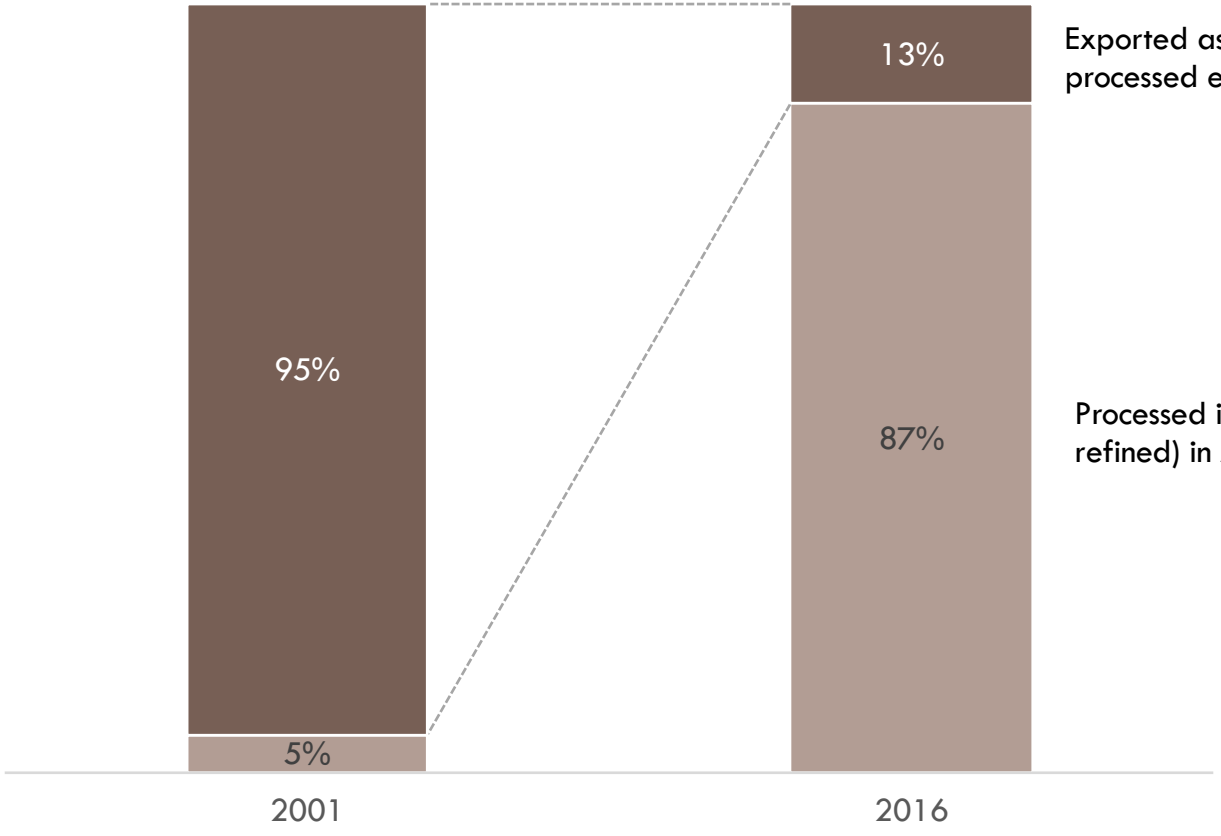


Source: Coriolis model based on a wide range of sources

The percent of shea nuts processed in Africa – at least to a crude butter stage – is increasing over time

AFRICAN EXPORTS OF SHEA NUTS & BUTTER BY "NUT EQUIVALENTS" VOLUME

%; "shea nut equivalents" (SETS) volume; 2001vs. 2016



Exported as raw kernels and processed elsewhere

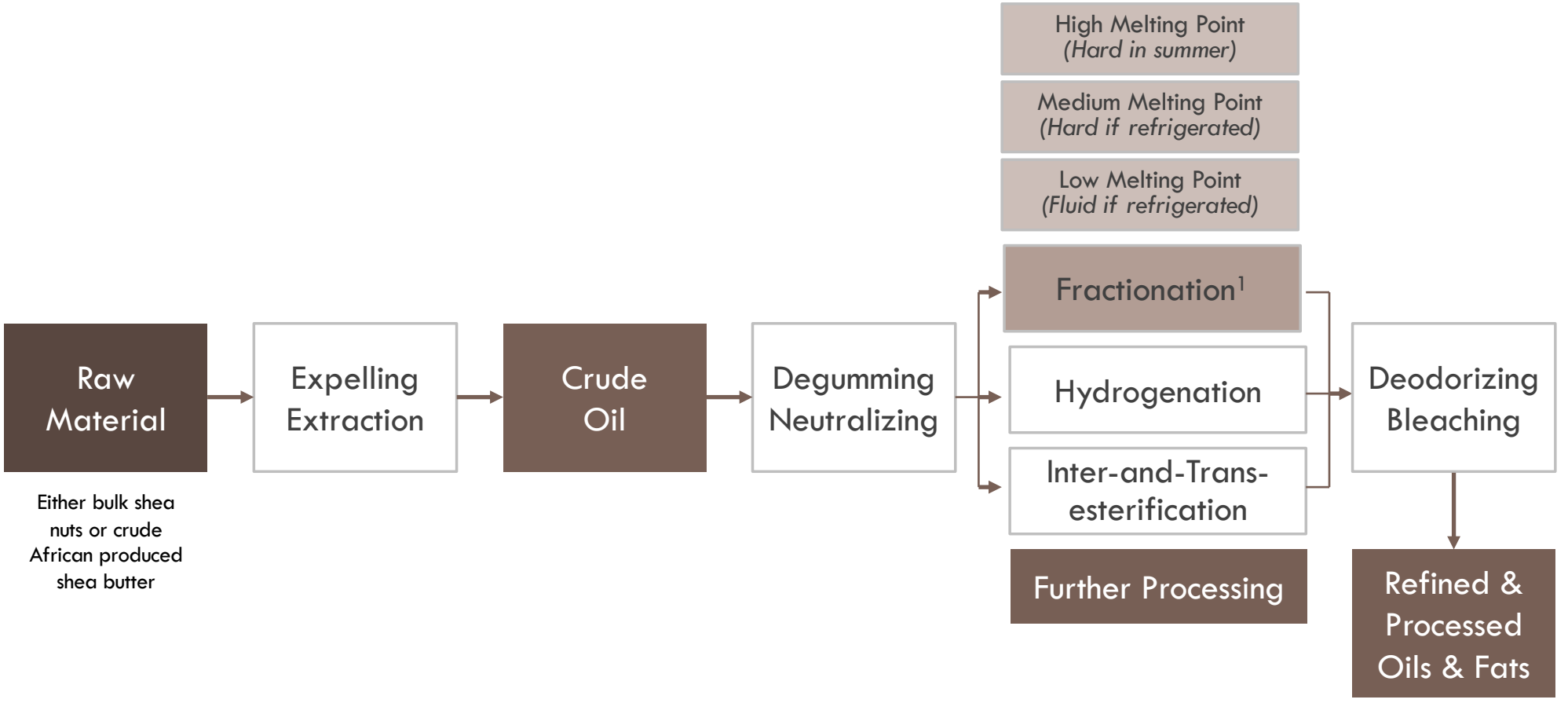
EXPORT ONLY
EXCLUDES SHEA BUTTER CONSUMED IN AFRICA

Processed into shea butter (raw or refined) in Africa then exported

This will likely be further refined and fractionated in another plant elsewhere

Source: articles, Coriolis

Industrial processed shea butter, like all vegetable oils, goes through a multi stage refining and fractionating process



1. Separating the stearin from the olein. Source: Fuji Oils website; Coriolis analysis

A handful of large firms dominate shea processing globally

					
SWEDEN/ DENMARK	UNITED STATES	JAPAN	INDIA	UNITED STATES	GERMANY
Listed: OMX	Listed: NYSE	Listed: Tokyo	Private	Listed: NYSE	Private
Revenue: US$2.9b Employees: 3,400	Revenue: US$46b Employees: 32,000	Revenue: US$2.7b Employees: 5,100+	Revenue: US$258m Employees: 5,000+	Revenue: US$60.8b Employees: 32,300	Revenue: US$613m Employees: 1,300
aak.com	bunge.com	www.fujioilholdings.com	www.fff.co.in	www.adm.com	stern-wywiol-gruppe.de

Source: annual reports; Coriolis analysis

Shea is an important ingredient in the major oil and fat processors portfolios

"To meet diversifying demand for chocolate and food products that contain it, cocoa butter equivalents (CBE) are also diversifying. Shea butter, which is produced in Africa, is an **indispensable raw material for making superior CBE**…Group company International Oils and Fats Ltd in Ghana carries out the nut-sorting process for shea butter in-house." *Company website*

FUJI OIL HOLDINGS INC.

"Archer Daniels Midland and Singapore's Wilmar Holdings will launch a joint venture in Ghana to process shea nuts into butter and oils… We are doing high quality products no one is doing in West Africa right now. It is not just shea nut crushing, we are producing specialty fats and oils for big food processing companies." *Press release, 2006*

ADM

"There is a **big demand** for our product in the market place as shea is a known commodity for use in confectionery products." *Company website*

AAK

"3F pioneered process technology in India, the process of both dry fractionation and solvent fractionation. These techniques have been used to **manufacture** world-class Sal, Mango & Shea stearin & Kokum fats." *Company website*

3F INDUSTRIES LTD.

Source: company websites; Coriolis analysis

These firms demand sustainability and traceability from their shea supply chain

EXAMPLE: BUNGE SHEA DASHBOARD

2018

Traceable

Ethical/Social

Environmental

Social/Ethical

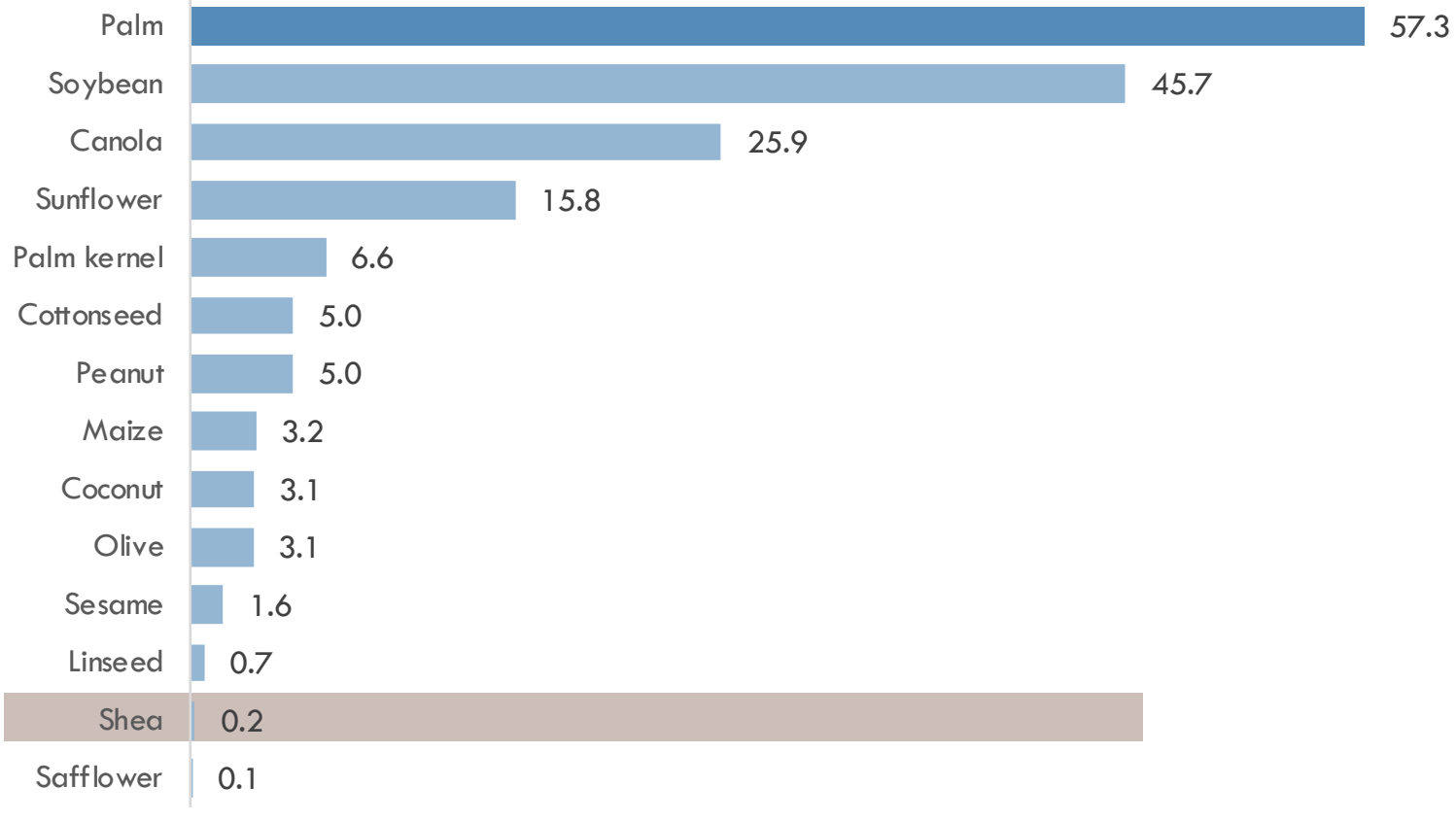
Source: Bunge website; Coriolis analysis

However, shea butter is a minor global oil and fat overall

Note: Palm oil must be fractionated and highly processed to be used as an effective CBE

GLOBAL PRODUCTION MAJOR EDIBLE OIL & FAT

Tonnes; m; 2014



Note: data is major "commercial" plant oils only and excludes minor plants and nut oils. Source: UN FAOSTAT; Coriolis analysis

Shea production for export is concentrated in West Africa where it is under pressure

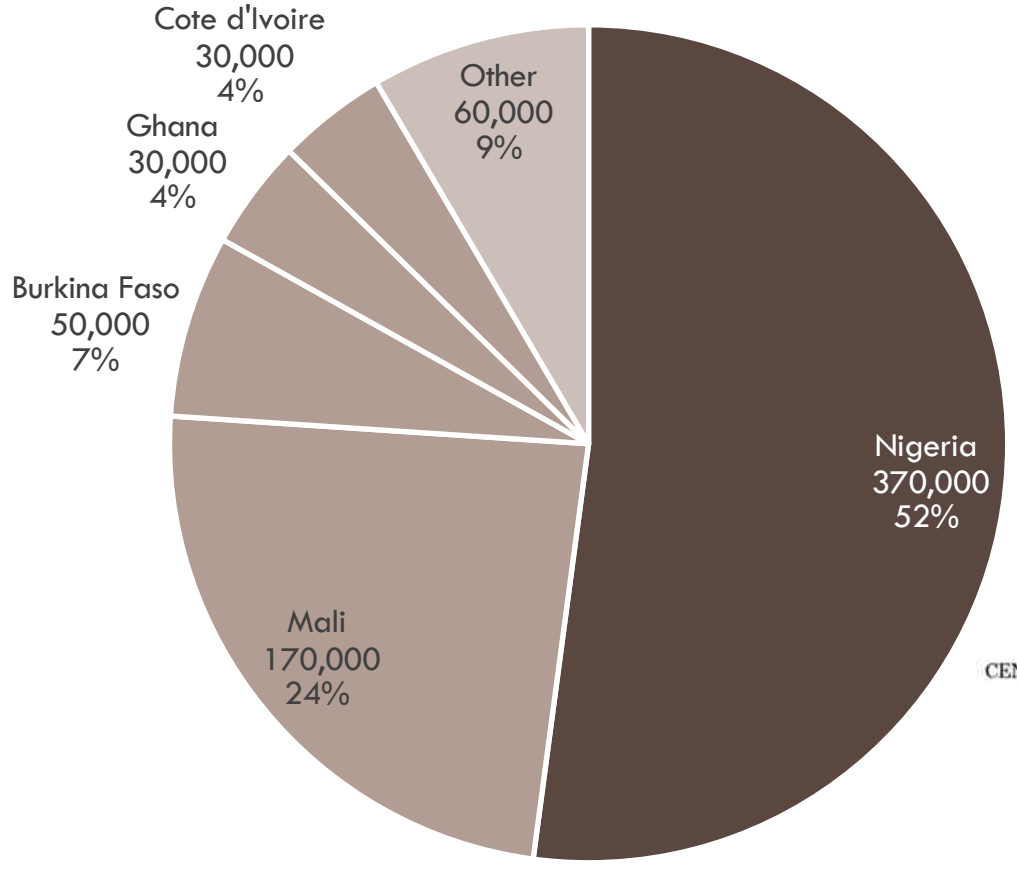
- Five countries – Nigeria, Mali, Burkina Faso, Ghana & Ivory Coast – account for 91% of commercial shea nut production
  - Due to varying levels of semi-farmed and wild collection, countries vary in the level of "potential" shea they actually collect
- Global shea production appears to have stalled for supply – not demand – reasons
  - Shea nut production has stalled, with more area being harvested, though at falling yields
  - African shea production is under pressure from alternative land uses and other challenges
  - Production growth has slowed across the major producing regions, but is growing in smaller areas
- The key marketable component of shea nuts is their butter (oil/fat), which make up 33% of dry weight
- Shea nuts are processed into shea butter, both in Africa and elsewhere; shea butter is used in chocolate, cosmetics and cooking
  - Shea butter is either (1) processed at small scale and used locally in Africa or (2) processed at industrial scale for major markets
  - The percent of nuts processed in Africa – at least to a crude butter stage – is increasing over time
- Current shea supply is inconsistent, creating an opportunity for a reliable country like Australia to enter the market

Five countries – Nigeria, Mali, Burkina Faso, Ghana & Ivory Coast – account for 91% of commercial shea nut production

SHEA NUT PRODUCTION

Tonnes; 2016

TOP 5
91%



"56 per cent of the production of shea nuts [in Nigeria] are exported, and the balance is either consumed locally or smuggled out of the country, resulting in a loss of revenue."

CENTRAL BANK OF NIGERIA

TOTAL = 718,000 tonnes of nuts collected

Known issues exist with African data, including shea data; treat as directional

Source: UN FAOSTAT; The Shea Butter Value Chain, USAID, Dr. Peter Lovett; various articles and reports; Coriolis analysis and estimates

In Africa, shea is both "wild collected" and grown in managed agro-forestry or "farmed parkland" near villages

1

Shea (and other plants) growing wild in savannah; occasionally collected by humans*
Much lower yield (1kg/tree)
Lower density (1-5 tree/ha)

2

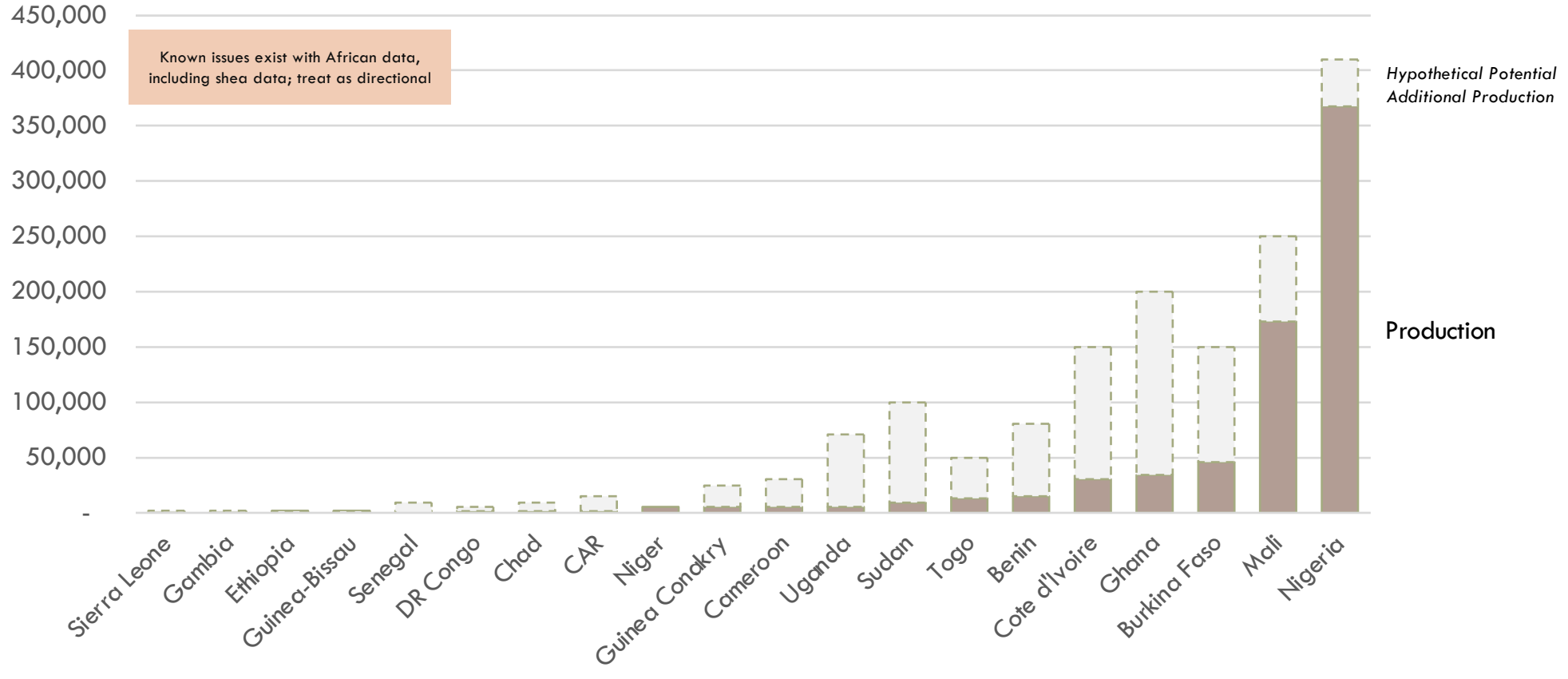
Managed agro-forestry shea near villages regularly collected and sold as cash crop
Higher yield (20-45kg/tree)
Higher density (15-50 tree/ha)

** Need to be in walking distance of a village. Photo credit CC BY-SA 4.0 (Neonstar); CC BY-NC-ND 2.0 (CIFOR). Source: Coriolis analysis*

Due to varying levels of semi-farmed and wild collection, countries vary in the level of "potential" shea they actually collect

ESTIMATED SHEA PRODUCTION BY COUNTRY: ACTUAL & HYPOTHETICAL POTENTIAL

Tonnes; 2016



Source: UN FAOSTAT; The Shea Butter Value Chain, USAID, Dr. Peter Lovett; various articles and reports; Coriolis analysis and estimates

Shea nut production has stalled, with more area being harvested, though at falling yields

AREA HARVESTED

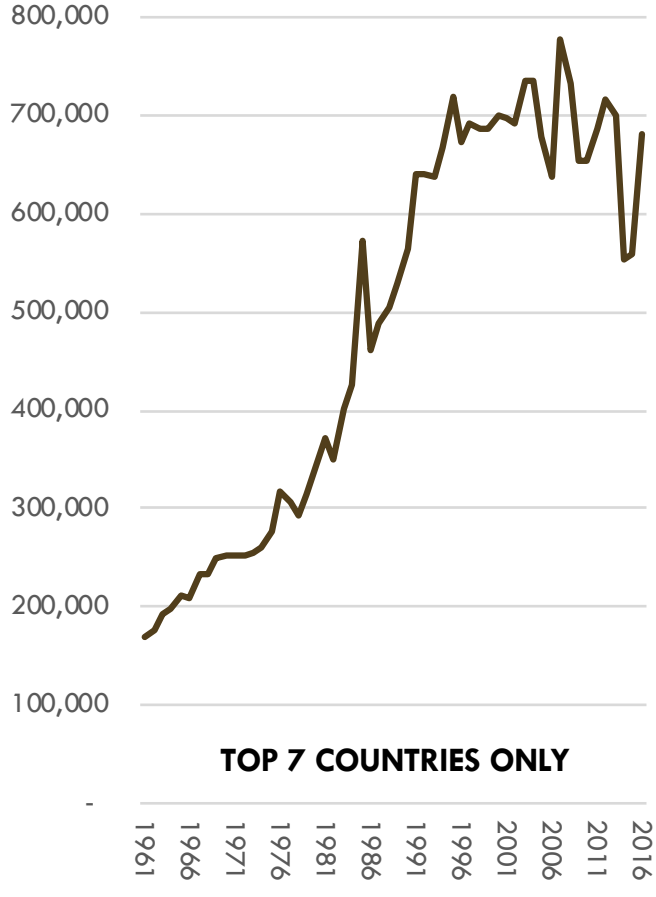
Hectares; 1961-2016

REALISED YIELD

Tonnes/hectare; 1961-2016

COLLECTED VOLUME

Tonnes; 1961-2016



Source: UN FAOSTAT; Coriolis analysis

African shea production is under pressure from alternative land uses and other challenges

- "This year, **we have shortage of Shea nuts because of cutting down of trees.** If you are going along the road, you will see Shea butter trees cut down for firewood… We are trying very hard to see that the cutting down of these trees is stopped." *Hajiya Aisha Mohammed, Niger State Public Private Partnership Officer, July 2018*

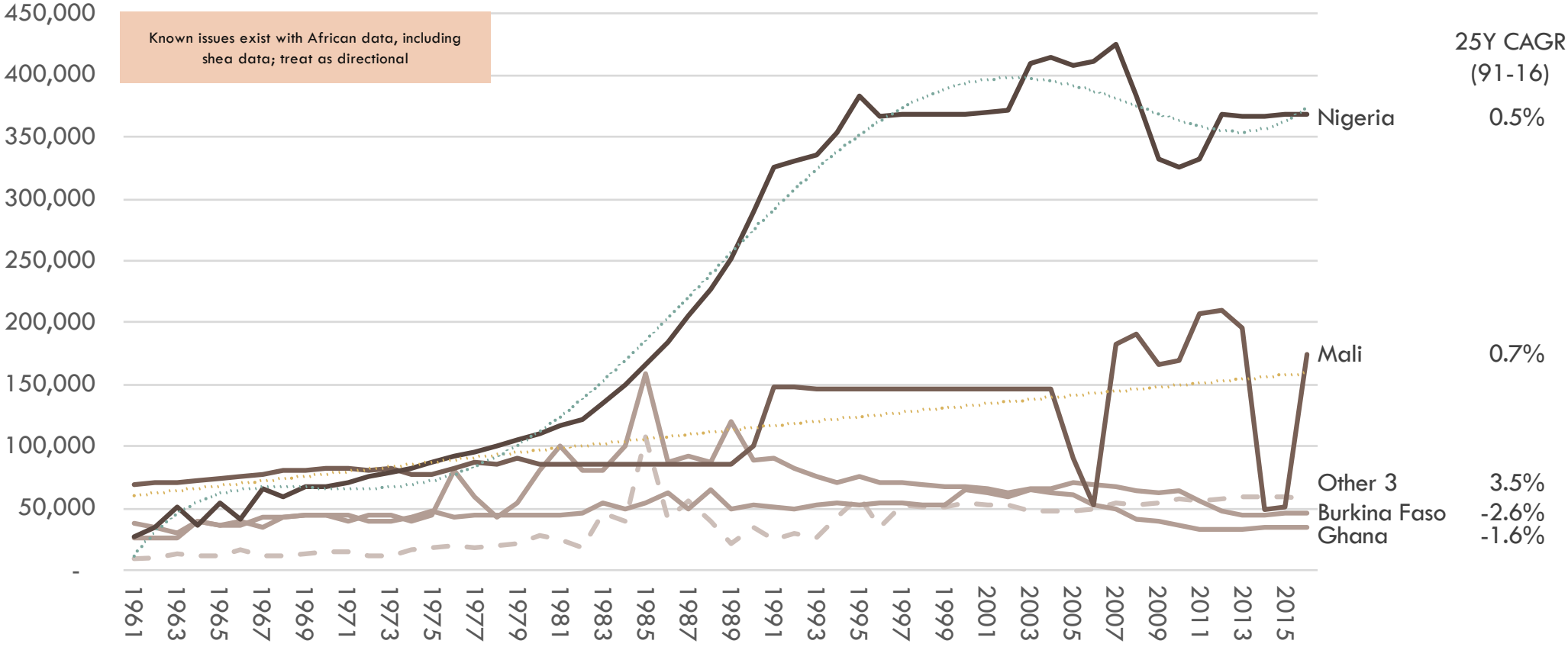
- "Observations and discussions with shea stakeholders indicate that Côte d'Ivoire has a far smaller shea crop than previously believed due to **significant parkland clearances for food production**… Ghana, Benin, and Burkina Faso's shea production are all **heavily exploited,** leaving few accessible shea fruits in the parklands after the annual harvest… Furthermore, there is a growing concern that Ghana's production may be heading in the same direction as Côte d'Ivoire's. Ghana is **rapidly losing shea tree populations due to land conversion to farmland for the production of food crops** and due to a lack of sufficient fallow periods to facilitate natural regeneration. Unfortunately, the pathway to a sustainable planting and growth regimen that could support the sustainable future exploitation of shea has been difficult to establish." *Shea Roadmap, USAID, March 2018*

- "African mistletoe already affects a large portion of the shea population, including almost all of Burkina Faso's trees." *Lost Crops of Africa, 2006*

Production growth has slowed across the major producing regions, but is growing in smaller areas

55 YEAR SHEA NUT PRODUCTION BY TOP 7 COUNTRIES ONLY

Tonnes; 1961-2016



Source: UN FAOSTAT; Coriolis analysis

Current shea supply is inconsistent, creating an opportunity for a reliable country like Australia to enter the market

- "Common constraints affecting the shea sector include unpredictability of supply, inefficient processing techniques, quality control, access-to-finance, poor communications, transportation issues, poor packaging and lack of market linkages." *USAID, Jan 2013*

WHERE IS THE MARKET FOR SHEA BUTTER?

02

+ Processing

+ Trade

+ Products

2.1 The shea trade is large and growing

- Shea is a US$152m global market, growing at 14% per year, on the back of high demand in chocolate, cosmetics and elsewhere; macro drivers are pushing growth in global shea trade volume and value as Africa cannot keep up with demand
- Shea has a wide range of uses and a long history in regional and global trade
- The shea trade from Africa is worth US$152m and represents 269,000 "nut equivalent" tonnes
  - The global shea trade has been growing at 14% (15y CAGR) driven by shea butter products
  - Value growth in the global shea trade is coming from higher volumes and higher prices, particularly in processed oils/fats
- Ex-Africa shea nut trade is stable
  - Global unprocessed shea nut exports have stabilised at around US$30m per annum with Ghana and Nigeria the main suppliers
  - Global unprocessed shea nut exports go predominantly to India and Europe
- Shea butter trade is growing
  - Global trade in processed shea butter products has been growing at 21% (15y CAGR), with Ghana as the largest supplier
  - The key markets for shea butter products is Europe and Malaysia, but recent growth has also come from other markets

Shea is a US$152m global market, growing at 14% per year, on the back of high demand in chocolate, cosmetics and elsewhere

5 countries
in Africa account for 91% of production

718,000 tonnes
of shea nuts produced in 2016

Africa
Currently supply all world trade

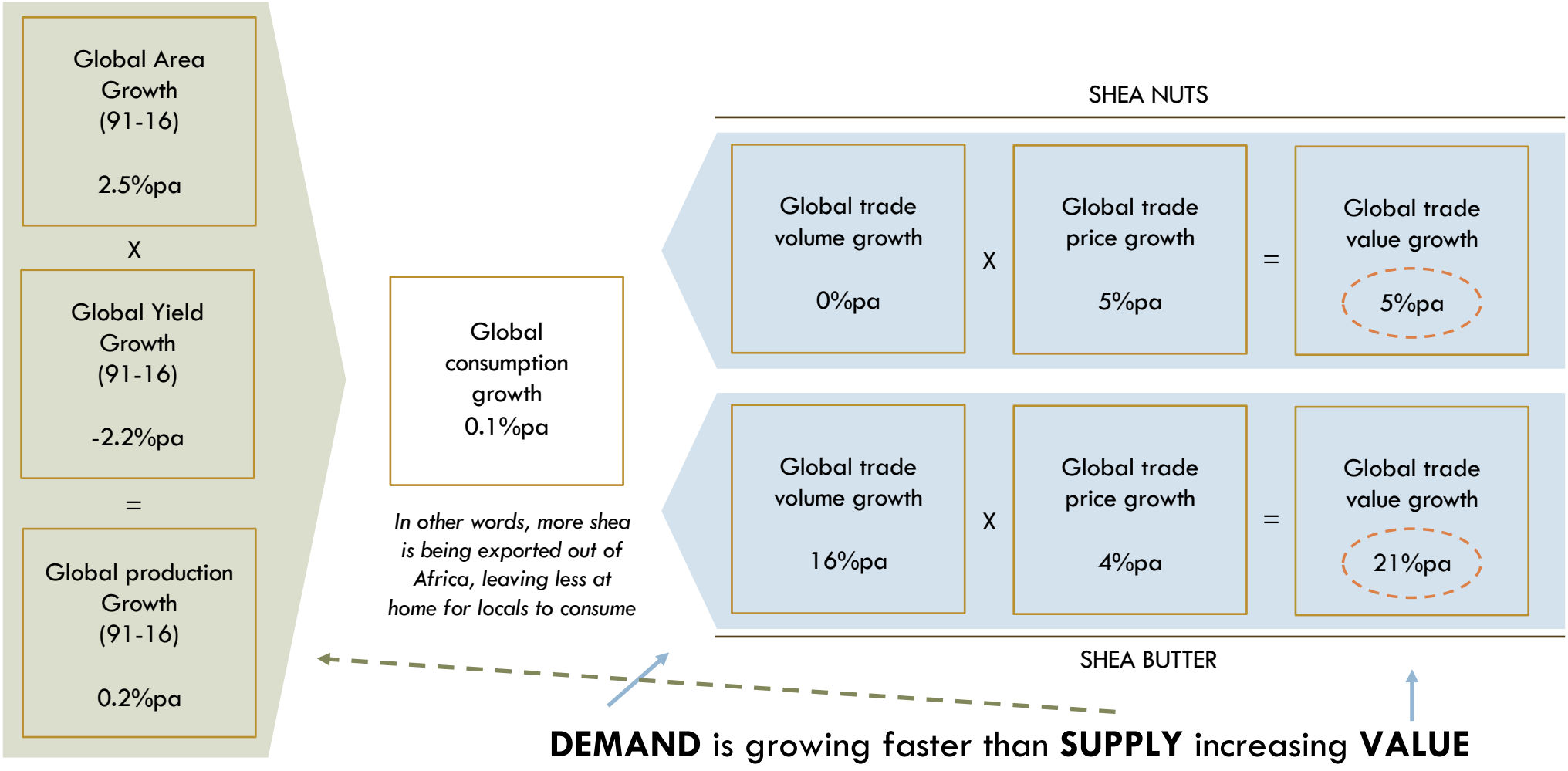
14% year
trade value growth (15y CAGR)

US$152m
global trade value in 2017
(outside shea region)

249,000 tonnes
of shea butter produced in 2017

Source: various published articles; UN FAOSTAT; Coriolis analysis and estimates. Photo Credit: Freepik from www.flaticon.com

Macro drivers are pushing growth in global shea trade volume and value as Africa cannot keep up with demand



Source: various data sources and methodologies documented elsewhere; Coriolis analysis and estimates

Shea has a wide range of uses

- "Both the seed kernels and the butter are shipped to Europe and Japan, and now the United States, where they are processed into **baking fat, margarine, cocoa-butter substitutes,** and various **beauty aids…** Although renowned for the food it provides, this tree's non-food products are valuable too. Across West Africa, shea butter is applied to the **skin** and **hair**. Refined in modern factories, it is incorporated into **soaps, ointments,** and **skincare** products of numerous kinds. It is also used to **waterproof** the **walls** of houses, so as to stop the infrequent downpours from washing the mud away. Furthermore, it is a staple of West African **medicine**. For thousands of years local healers have used the pasty solid to **protect** small **wounds, heal infections,** and **soothe** the **aches** of sprains and strains. Moreover, they prescribe it as a **decongestant** and an **arthritis treatment.**" *Lost Crops of Africa, 2006*

Shea butter has a long history in regional and global trade

EARLY EXPORTS

Early Days

- Indications of trade with and use by Ancient Egyptians
- Arab writer Ibn-Batuta records trade in 1354
- Scottish Explorer Mungo Park records product in 1797
- Early French colonies in Africa export shea kernels to France in 1900's
- Loders & Nucoline (now Bunge) of UK launch cocoa butter substitute in 1887
- Aarhus Oliefabrik (AAK) launch improved cocoa butter substitute in 1930
- Issues even then with supply, quality, transport, and pricing instability

GOVERNMENT RULES

1960's and 70's

- Price stabilisation fund developed, then folded
- Independence of Upper Volta (Burkina Faso) in 1960
- Establishment of Shea Marketing Board established
- Price Stabilisation Fund created in 1964
- Colonial traders still dominate trade in the 60's
- Main buyers of CBE were AAK and Unilever (Loders)
- Wholesalers and national trade firms were established and colonial interests exited origination in 1970s

LIBERALISATION

1980s and 90's

- Reduced price for cocoa butter reduced demand for CBE in 1980's
- Thomas Sankara comes to power in Burkina Faso and makes many social and economic reforms, creating upheaval in shea trade
- New entrants in market (Olam, Fuji, etc.)
- Price of cocoa collapses, leading fall in shea demand
- Ghana Cocoa Board abandons regulation of shea industry in that country
- Processors reduce costs and increase efficiencies by increasing control in supply chain

NEW GROWTH

2000's+

- Shea comes into focus for global cosmetics industry
- Olam increased activity in region
- Loders emerged as major processor
- In 2006 Blue Mont installs fractionating plant in Ghana
- Arrival of 3F from India
- JV by Ghanan Wilmar and ADM
- Change to direct buying from womens groups (more traceable, sustainable, transparent pricing – higher costs)

Source: various published articles; Coriolis analysis

This project defines shea products as follows due to the lack of a specific "globally agreed upon" and used trade code

MARKET DEFINITION FOR GLOBAL TRADE ANALYSIS: SHEA NUT & SHEA BUTTER

HS trade codes; 2018

WHAT THE REST OF THE WORLD (OUTSIDE THE SHEA ZONE) REPORTS RECEIVING UNDER THESE TRADE CODES…

HS CODE	OFFICIAL DESCRIPTION
Shea nuts and kernels	
120799	Other oil seeds and oleaginous fruits, whether or not broken; other; not elsewhere specified
121299	Oil seed, oleagic fruits, etc,; fruit stones and kernels and other vegetable products; not elsewhere specified
Shea butter (oil/fat)	
151590	Other fixed vegetable fats and oils and their fractions, whether or not refined, but not chemically modified; other
151620	Vegetable fats and oils and their fractions, partly or wholly hydrogenated, inter-esterified, re-esterified or elaidinised, whether or not refined, but not further prepared;
151710	Edible mixtures or preparations of animal or vegetable fats or oils or of fractions of different fats or oils other than edible fats or oils or their fractions of heading No. 15.16.
330499	Beauty, makeup and suntan preparations nes other
3401 11/19/20	Soaps, not elsewhere specified, other

X

ONLY FROM THIS SPECIFIC LIST OF COUNTRIES…

COUNTRIES IN SHEA ZONE KNOW TO PRODUCE FOR EXPORT	
Benin	Niger
Burkina Faso	Nigeria
Cameroon	Sierra Leone
Chad	Somalia
Côte d'Ivoire	South Sudan
Gambia	Sudan
Ghana	Togo
Mali	Uganda
Mauritania	

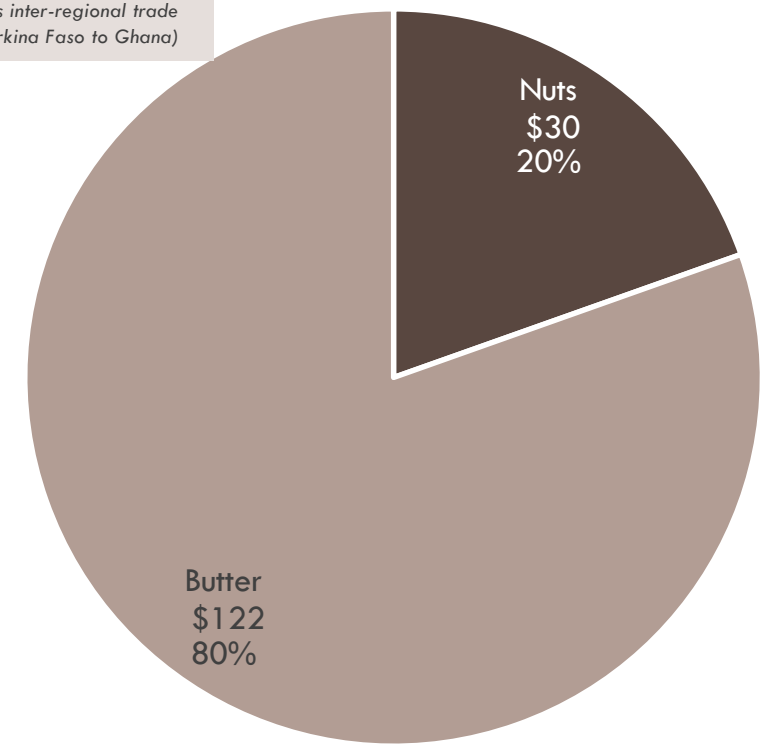
Source: Global HS Standard; analysis of UN Comtrade data; Coriolis analysis and estimates

The shea trade from Africa is worth US$152m and represents 269,000 "nut equivalent" tonnes

SHEA EXPORT VALUE

US$; m; 2017

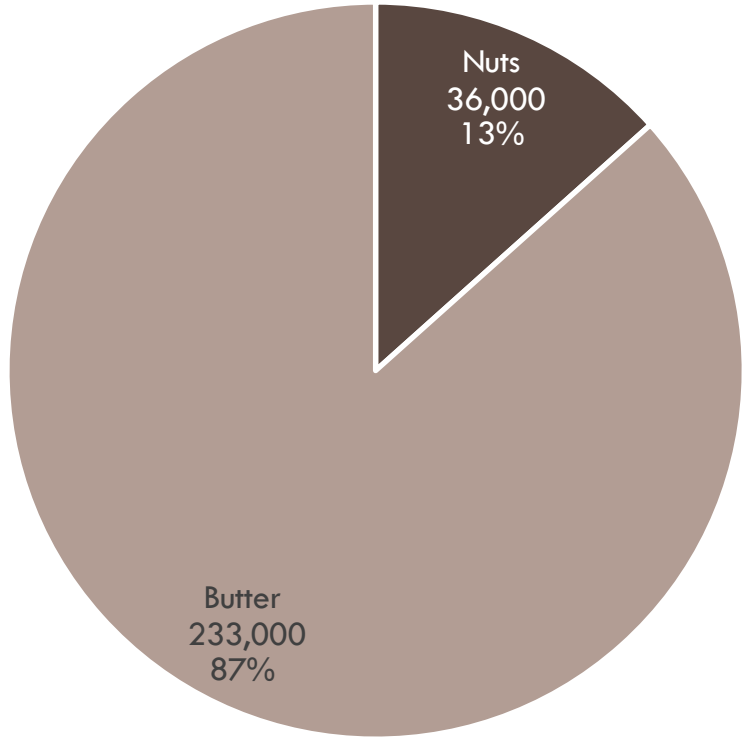
NOTE: Data is last reported port of exit from shea region; excludes inter-regional trade (e.g. Burkina Faso to Ghana)



TOTAL = $152m in exports from the region

SHEA EQUIVALENT EXPORT VOLUME

Tonnes; shea nut equivalent; 2017



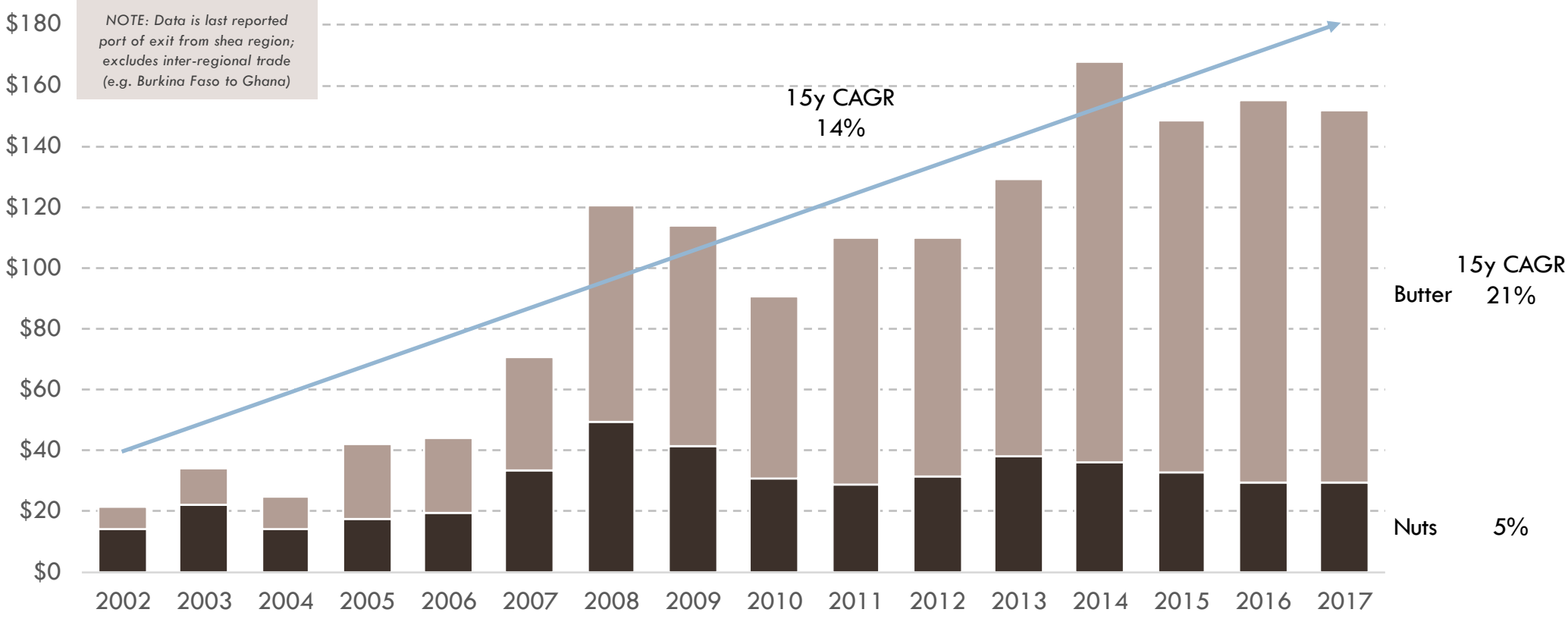
TOTAL = 269,000 tonnes shea nut equivalent

Source: UN Comtrade; Coriolis classification and analysis

The global shea trade has been growing at 14% (15y CAGR) driven by shea butter products

VALUE OF UNPROCESSED SHEA NUT EXPORTS FROM AFRICA TO WORLD MARKETS

US$; m; 2002-2017

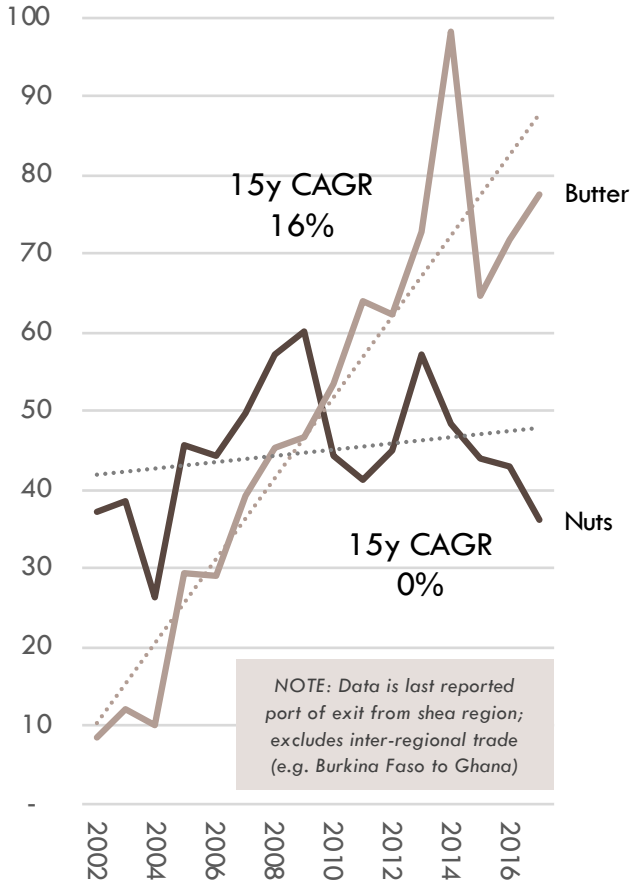


Source: UN Comtrade; Coriolis classification and analysis

Value growth in the global shea trade is coming from higher volumes and higher prices, particularly in processed oils/fats

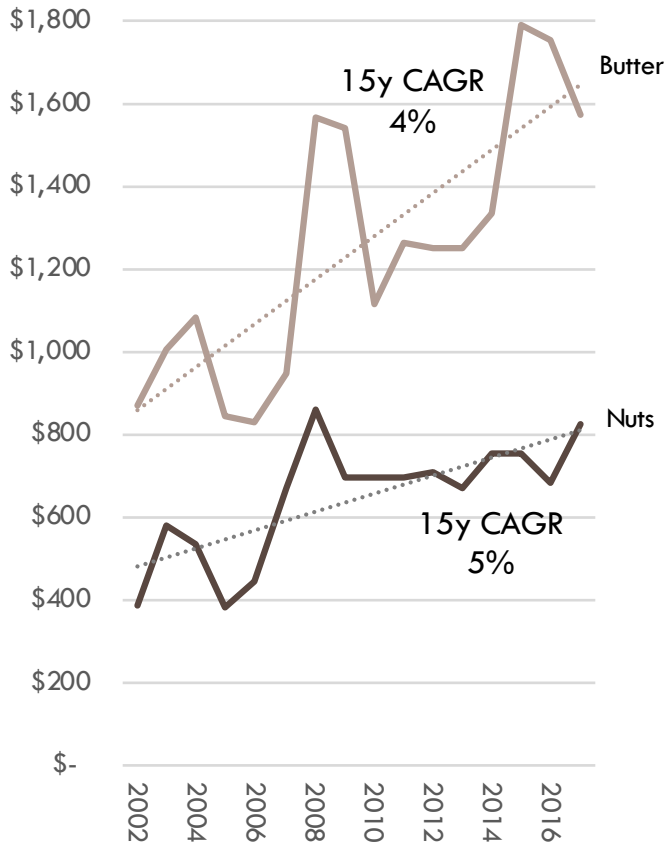
GLOBAL IMPORT VOLUME

Tonnes; 000; 2002-2017



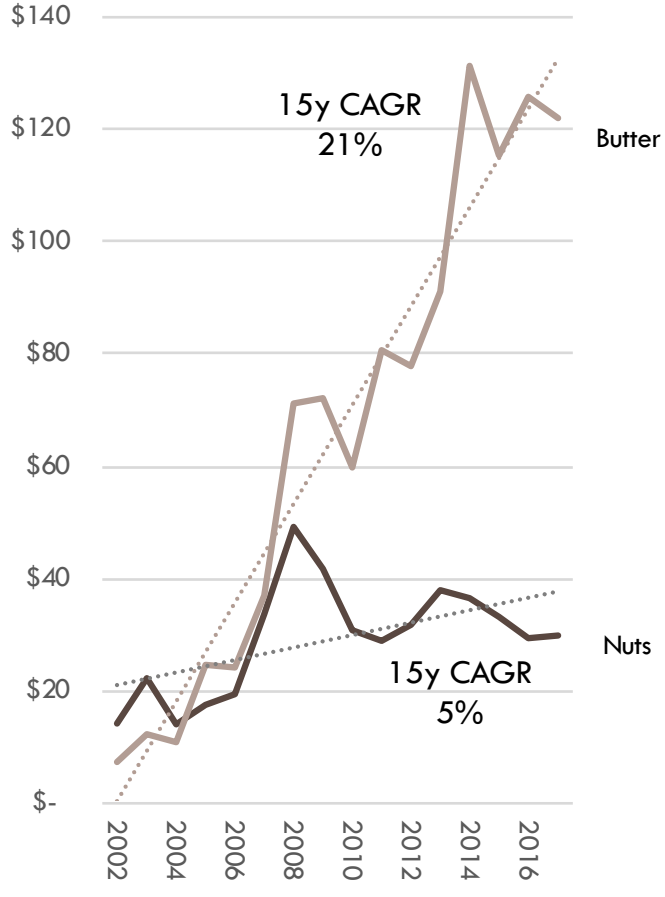
AVERAGE CIF PRICE

US$/t; landed CIF; 2002-2017



GLOBAL IMPORT VALUE

US$; m; landed CIF; 2002-2017

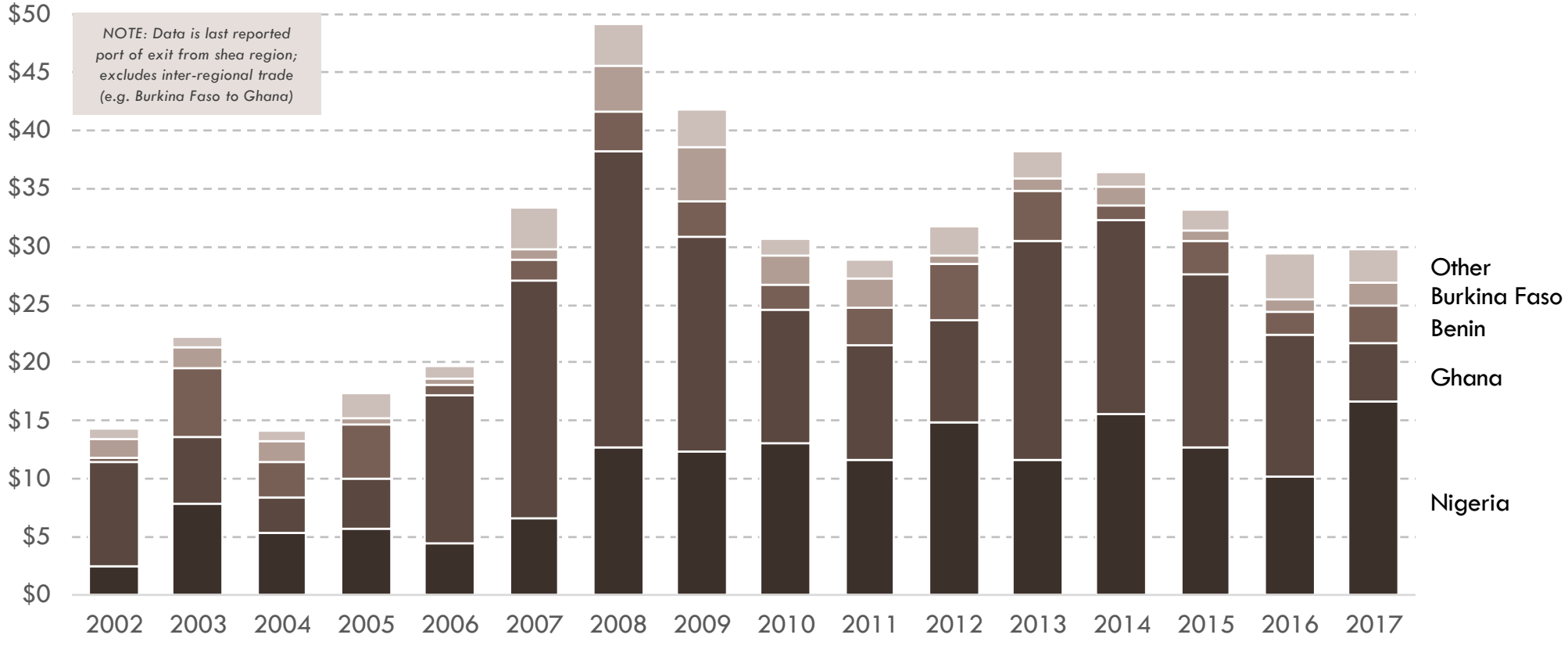


Source: UN Comtrade; Coriolis analysis

Global unprocessed shea nut exports have stabilised at around US$30m per annum with Ghana and Nigeria the main suppliers

VALUE OF UNPROCESSED SHEA NUT EXPORTS FROM AFRICA TO WORLD MARKETS

US$; m; 2002-2017

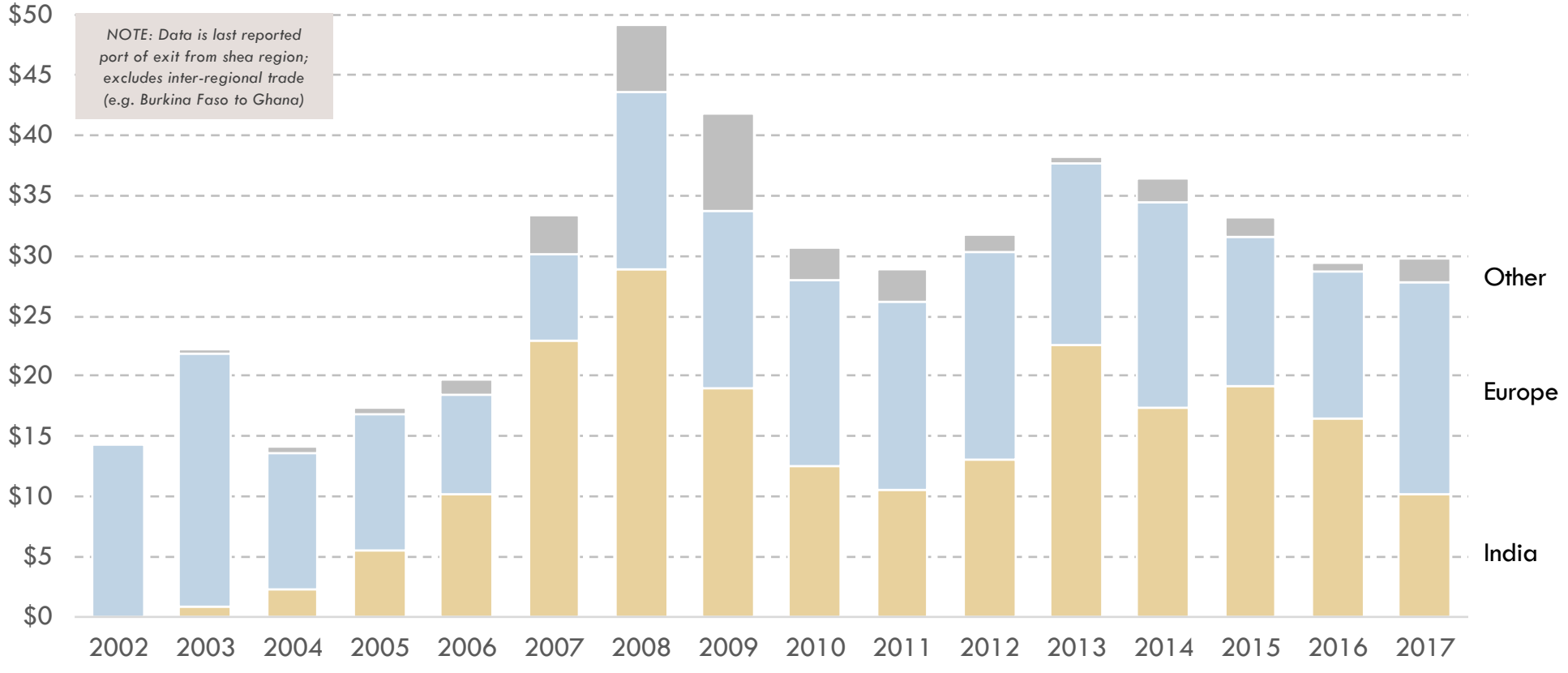


Source: UN Comtrade; Coriolis classification and analysis

Global unprocessed shea nut exports go predominantly to India and Europe

VALUE OF UNPROCESSED SHEA NUT EXPORTS FROM AFRICA TO WORLD MARKETS

US$; m; 2002-2017

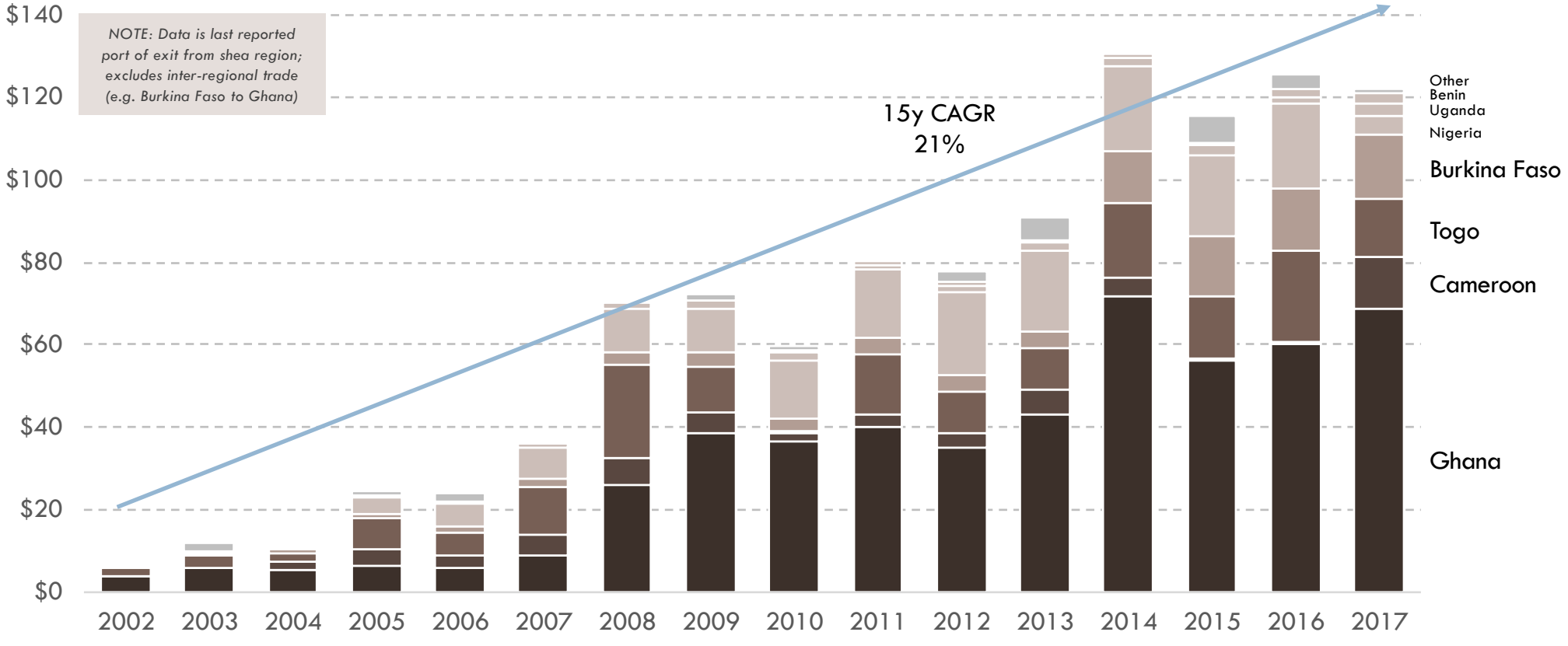


Source: UN Comtrade; Coriolis classification and analysis

Global trade in processed shea butter products has been growing at 21% (15y CAGR), with Ghana as the largest supplier

VALUE OF PROCESSED SHEA BUTTER EXPORTS FROM AFRICA TO WORLD MARKETS

US$; m; 2002-2017

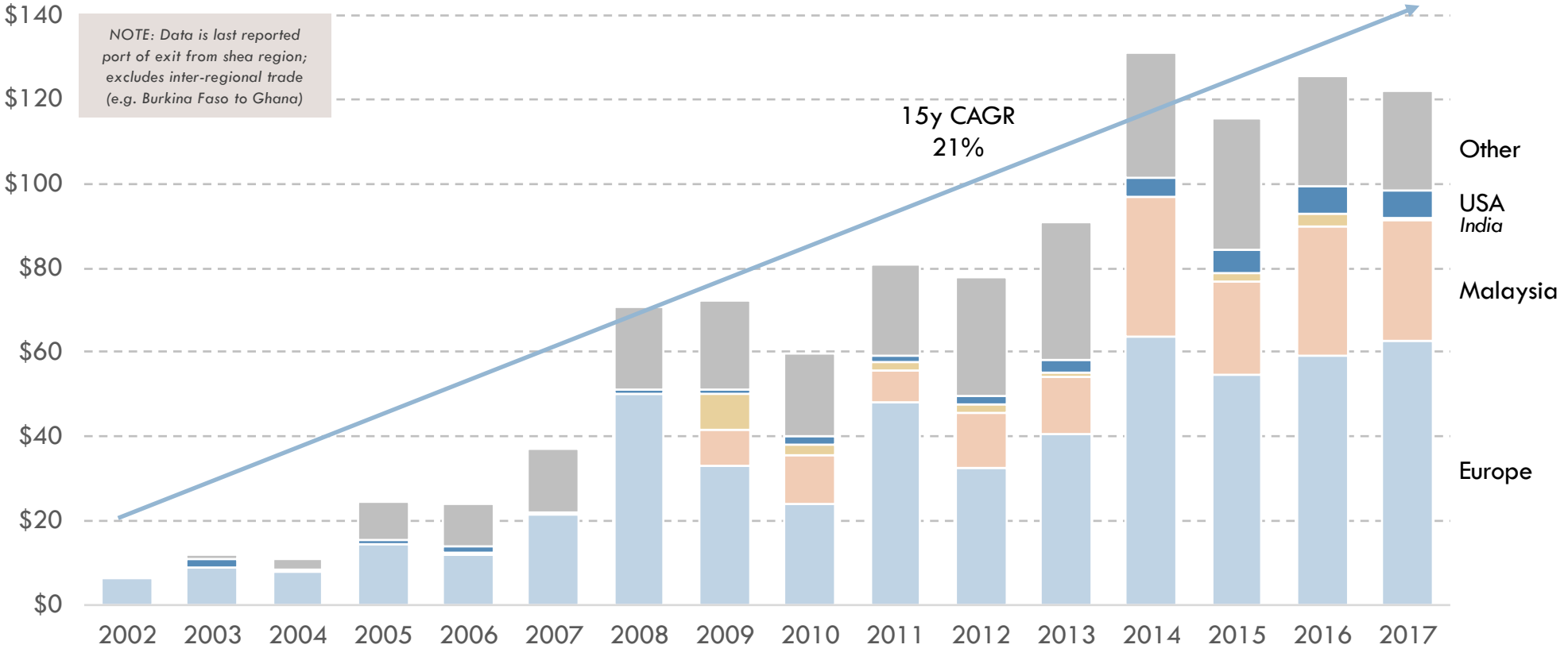


Source: UN Comtrade; Coriolis classification and analysis

The key markets for shea butter products is Europe and Malaysia, but recent growth has also come from other markets

VALUE OF PROCESSED SHEA BUTTER EXPORTS FROM AFRICA TO WORLD MARKETS

US$; m; 2002-2017



Source: UN Comtrade; Coriolis classification and analysis

2.2 Shea is used for its functional benefits across three key categories

1

CHOCOLATE

80-85%

Used as key alternative ingredient to cocoa butter

Chocolate
Confectionery

2

HEALTH & BEAUTY/COSMETICS

10-15%

Moisturising and beauty enhancing

Shea butter
Body wash
Skincare creams
Soap
Cosmetics

3

INGREDIENT/OTHER

5-10%

Low cost vegetable fat

Pastry
Sweetening biscuits
Bread and rolls
Pizza
Ice cream
Powders
Nutrition products
Neutraceuticals/Pharmaceuticals

Source: various published articles; Coriolis analysis. Photo Credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes; Coriolis purchased

First, chocolate is the largest user of processed shea butter, accounting for 80-85% of globally traded volume

1

CHOCOLATE

80-85%

Used as key alternative ingredient to cocoa butter

Chocolate Confectionery

Source: various published articles; Coriolis analysis. Photo Credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

2.2.1 Shea butter is highly dependent on the future of the chocolate industry

- Shea is primarily used in chocolate as a cheaper substitute for cocoa butter
- The price of shea butter moves in line with the price of cocoa butter, though at a significant discount
- Chocolate is an attractive market that will support demand for shea butter
  - The global chocolate market is large (US$100b) and growing at 6% per annum
  - Chocolate consumption is high across many countries and it continues to grow
- Cocoa Butter Equivalents (CBE) are used to replace cocoa butter, resulting in lower costs and functional benefits to chocolate
  - Shea is benefiting from growing global demand for CBE's; however, rules regarding use vary by region
  - There are a wide range of customers for Shea (as part of a CBE) across Europe, the USA and Asia

Source: Coriolis analysis

Shea is primarily used in chocolate as a cheaper substitute for cocoa butter

EXAMPLE: CADBURY DAIRY MILK UK

2018

INGREDIENTS

Sugar, cocoa butter, cocoa mass, vegetable fats (palm, shea), emulsifier (soya lecithin).

Cocoa solids 36% minimum.
Contains vegetable fats in addition to cocoa butter

INGREDIENTS

Milk, sugar, cocoa butter, cocoa mass, vegetable fats (palm, shea), emulsifiers (E442, E476), flavourings.

Milk solids 20% minimum, actual 23%.
Cocoa solids 20% minimum.
Contains vegetable fats in addition to cocoa butter.

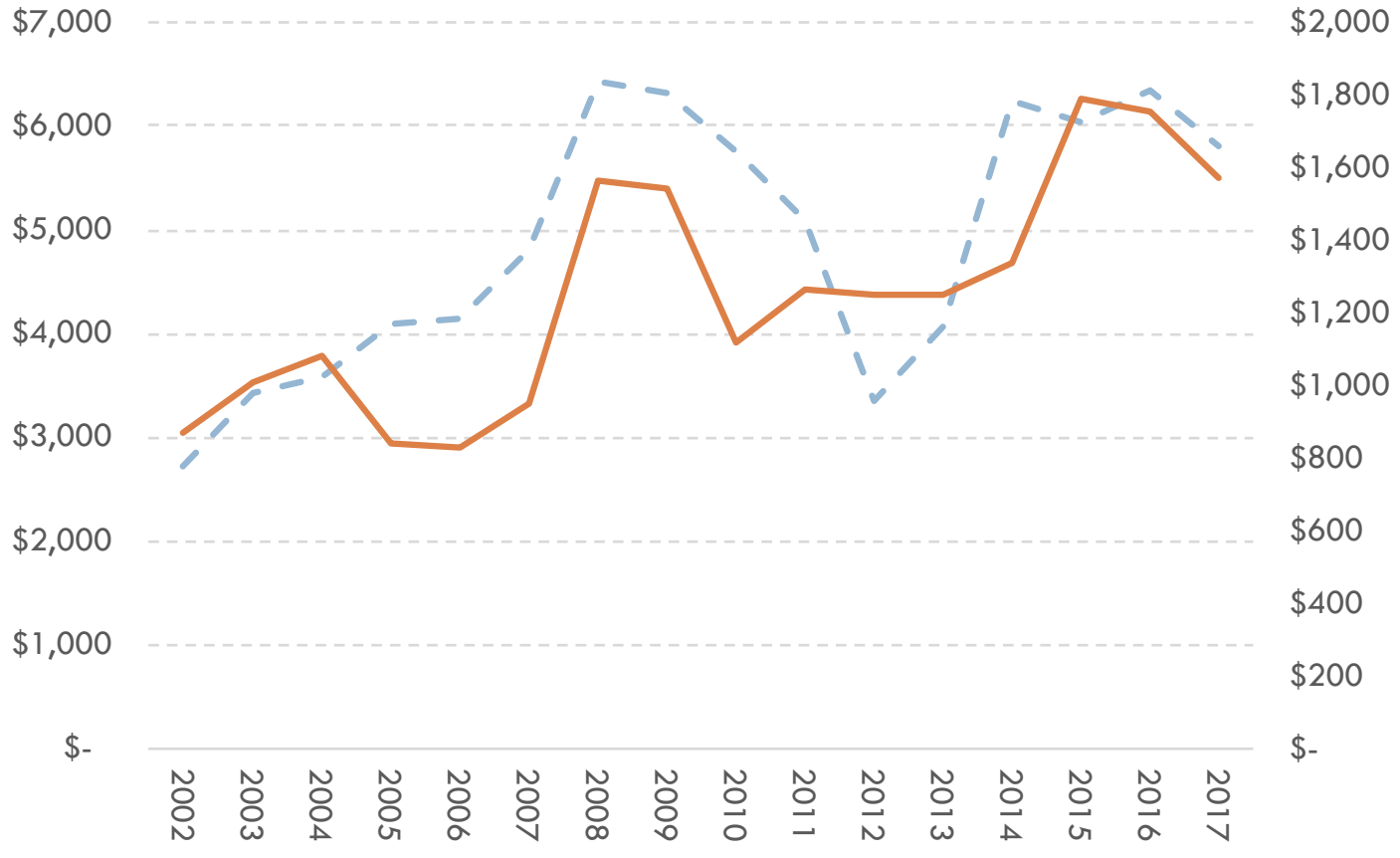
Note: Premium chocolate typically contains only cocoa mass and sugar. Source: Coriolis analysis. Photo Credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

The price of shea butter moves in line with the price of cocoa butter, though at a significant discount

AVERAGE IMPORT PRICE OF COCOA PRODUCTS AND SHEA BUTTER

US$/t; CIF; 2002-2017

COCOA BUTTER
dashed line
left axis



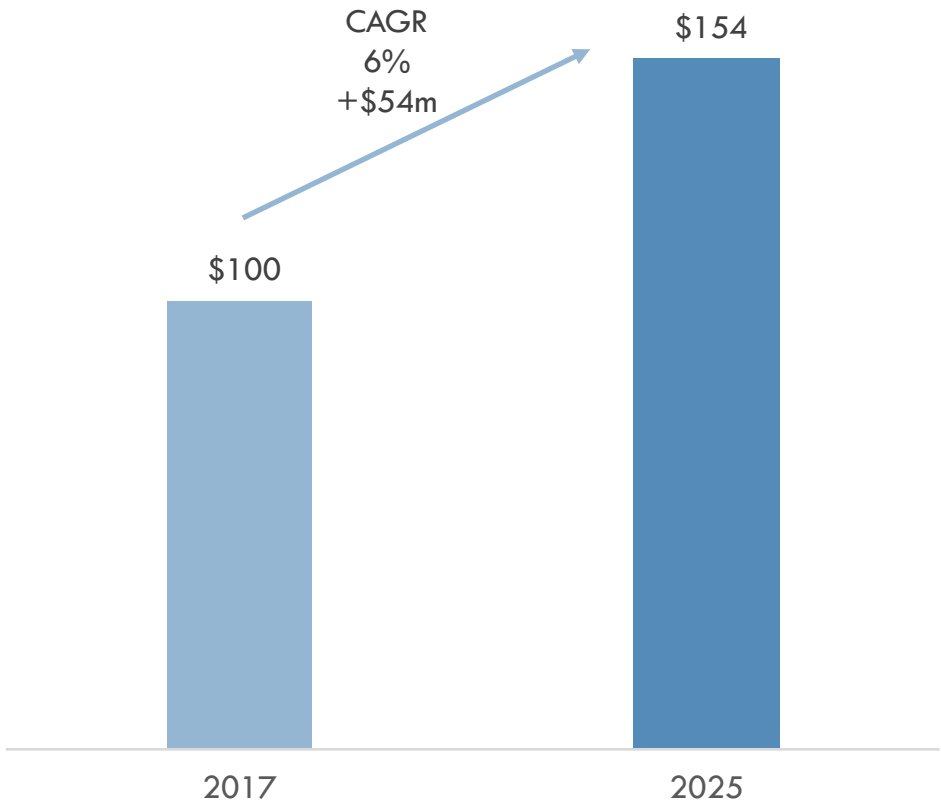
SHEA BUTTER
solid line
right axis

Source: UN Comtrade; Coriolis analysis

The global chocolate market is large (US$100b) and growing at 6% per annum

GLOBAL CHOCOLATE CONFECTIONERY MARKET

US$; b; 2017a vs. 2025f

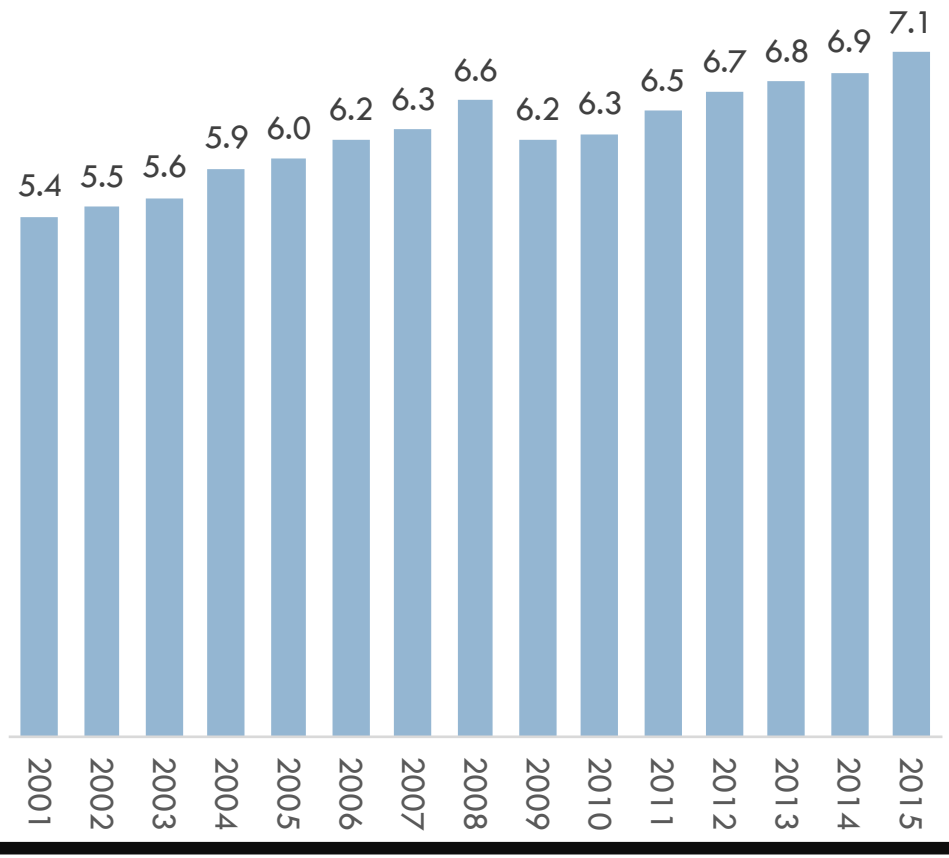


1. Confectionery sales; 2. Includes all sales. Source: Grand View Research, Candy Industry; Coriolis analysis

Chocolate consumption is high across many countries and it continues to grow

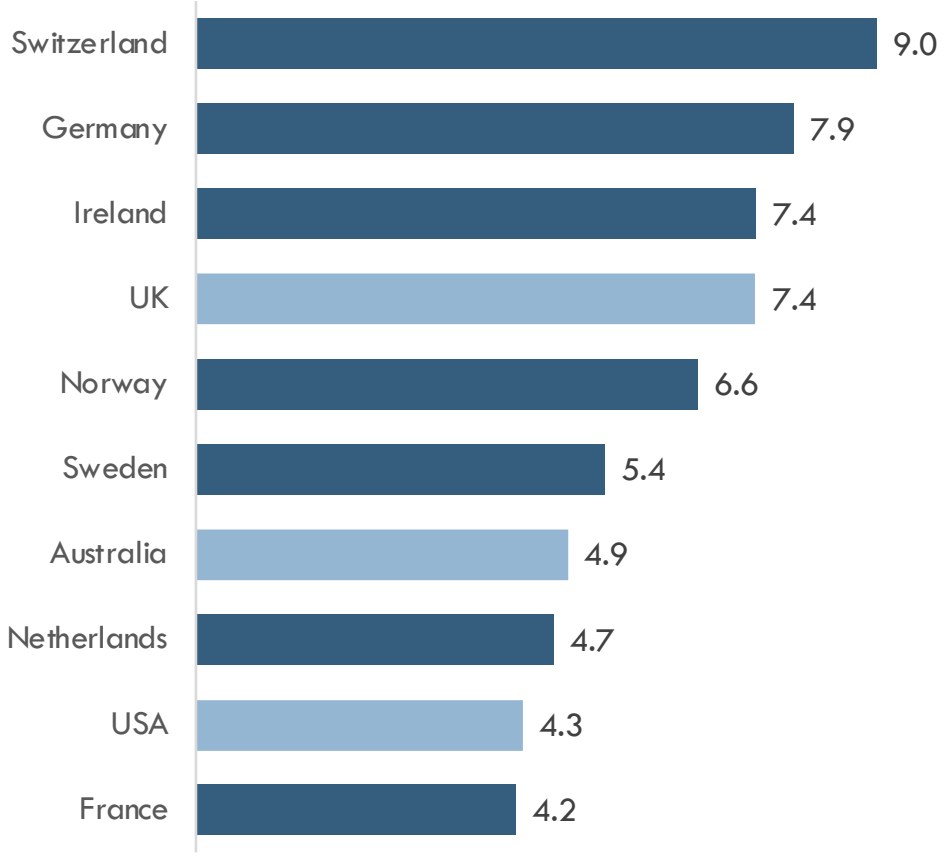
CHOCOLATE PRODUCT CONSUMPTION

Tonnes; m; 2001-2015



CHOCOLATE CONSUMPTION PER CAPITA

Kg/yr; 2016



Source: LMC International; Euromonitor; Coriolis analysis

Cocoa Butter Equivalents (incl. shea) are used to replace cocoa butter, resulting in lower costs and functional benefits to chocolate

TYPES OF COCOA BUTTER ALTERNATIVES OR REPLACEMENTS
2018

CBE EQUIVALENTS
- Can replace cocoa butter in part or whole
- Vegetable fats with similar chemical characteristics and fatty acid to cocoa butter;[1]
- Use does not alter the final product
- Examples: palm oil, **shea butter**, illipe oil, kokum butter, sal fat, mango kernel

CBI IMPROVERS
- Improves the functionality of chocolate
- High levels of triglycerides

- Makes cocoa butter harder
- Extends product shelf life
- Changes product melting point (important in hot countries)
- Modifies texture (more "snap")
- Reduces bloom (in high temperatures)
- Reduces price (cheaper than cocoa butter)

CBEX EXTENDERS
- Able to use less CB
- Combination of vegetable fats; able to be mixed with CB at varying ratios

1. Similar fatty acids: palmitic, stearic, oleic. Source: Coriolis analysis

Shea is benefiting from growing global demand for CBE's

- "Shea trade has experienced huge growth since the early 2000s… Healthier eating and rising incomes caused the growth in CBE's...demand for products with low/no trans fats resulted in greater demand for healthier fat substitutes such as CBE's." *USITC, 2008*

- "By substituting cocoa butter with CBEs in accordance with the EU Cocoa and Chocolate Products Directive 2000/36/EC, significant savings and functional improvements can be achieved." *Food ingredients First, 2010*

- "Shea stearin is the most important exotic fat used in CBE manufacture." *LMC International, 2016*

- "The CBE market has undergone huge growth since 2000. Western Europe is the main market for CBE, and the EU decision to allow 5% of CBE in chocolate has had some impact on the market…However, the growth of the CBE market is mainly driven by new markets such as Eastern Europe, Russia, Brazil, and Oceania. During 2000–05, the global CBE market increased by 29%." *USITC, 2008*

- "Over the recent years, the global Cocoa Butter Equivalent industry has been growing rapidly owing to rise in demand for chocolate, and high price of cocoa butter. Globally, the growth in Cocoa Butter Equivalent market is driven improvement in chocolate functionality on addition of cocoa butter equivalent." *Orbis Research, 2017*

Source: various articles and reports; Coriolis analysis

However, rules regarding CBE use vary by region

CURRENT LEGISLATION REGARDING CBE USE IN CHOCOLATE

2018

	ALLOWED	DETAILS
	YES	- EU Directive 2000/36/EC Cocoa and Chocolate Products - Restricts the use of CBE to maximum of 5% of the end product - Chocolate must contain 35% cocoa solids - 6 species allowed as CBE/CBI (including shea) - New law in effect Dec 2014 – all edible products must specify ingredients used (e.g. "shea" not "vegetable fat")
	NO	- USA FDA rule that CBE's are not permitted in chocolate but are permitted in chocolate coatings; these must be labelled "chocolate flavoured coating" or "compound coating" - Chocolate must contain 10% cocoa
ASIA	YES	- Use of CBE to maximum of 5% of end product
RUSSIA/UKRAINE	YES	- Use of CBE to a maximum of 15% of end product

Source: various articles; Coriolis analysis

There are a wide range of customers for Shea (as part of a CBE) across Europe, the USA and Asia

EXAMPLES: MAJOR GLOBAL CUSTOMERS FOR SHEA BUTTER (AS CBE)

2018

Global firms

East/South-East Asia firms

Source: various company websites; Coriolis analysis

2.2.2 Second, the health & beauty industry is a major uses or shea butter, accounting for 10-15% of globally traded volume

1

CHOCOLATE

80-85%

Used as key alternative ingredient to cocoa butter

Chocolate
Confectionery

2

HEALTH & BEAUTY/COSMETICS

10-15%

Moisturising and beauty enhancing

Shea butter
Body wash
Skincare creams
Soap
Cosmetics

Source: various published articles; Coriolis analysis. Photo Credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes; Coriolis purchased

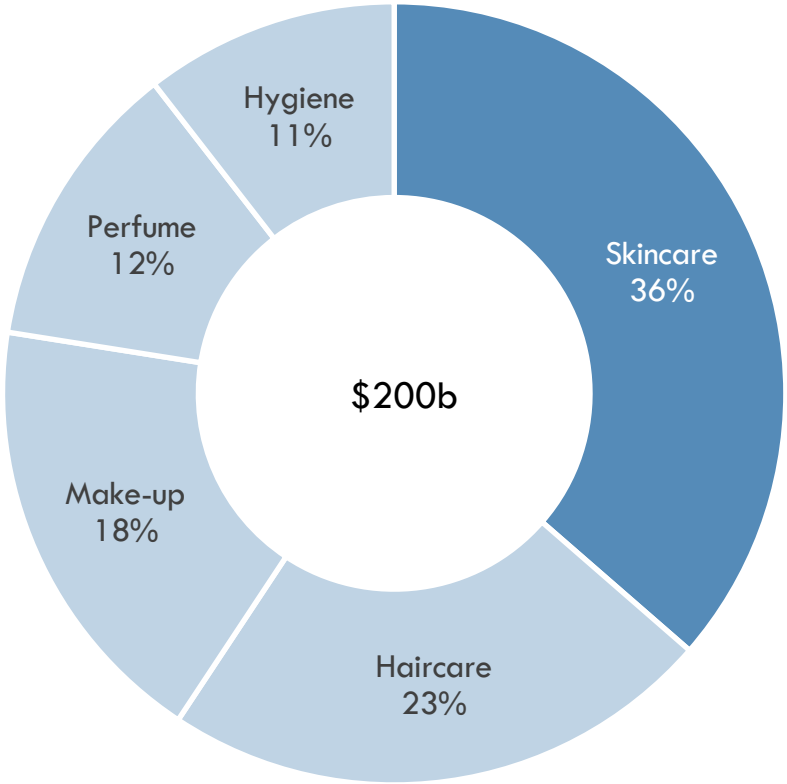
Shea is a well-known ingredient in the cosmetics industry recognised by consumers

- Beauty and cosmetics is a $200b global industry
- There is strong cultural, historical and scientific support for the use of shea in beauty & health
  - Shea has been used for centuries as a cosmetic and medical product throughout Africa
  - Shea's fatty acid structure makes it very beneficial to human skin; shea butter both moisturises and heals
- Shea has achieved widespread use across the industry
  - Shea is used in butter form as a beauty product, both "unrefined" and minimally processed ("raw")
  - Shea is used as a headline ingredient on the front of moisturises and shampoo labels
  - Shea is used as a named ingredient, called-out on many other cosmetic products, from body washes, to soaps and cosmetics
  - Premium global brands offer full product ranges featuring shea
  - As an example, shea is a listed ingredient in over sixty health and beauty products at Woolworths Australia

Beauty and cosmetics is a $200b global industry

GLOBAL BEAUTY & COSMETICS INDUSTRY BY VALUE

US$; %; 2017



1. Excludes soaps, toothpaste, razors, blades, etc. 2. Net manufacturer prices. Source: Loreal; Coriolis analysis

Shea has been used for centuries as a cosmetic and medical product throughout Africa

"Shea butter has been used for centuries on the African continent… Shea butter is mentioned in almost all African historical documents, including a reference as early as Cleopatra's Egypt, which mentions caravans bearing clay jars of shea butter for cosmetic use… Shea butter has many useful properties and has been used for traditional hair and skin care. However, the protective and emollient properties of shea butter are most valued for skin care. Shea butter is a main ingredient in local soap production, and is applied to the skin and hair directly to protect them from drying out in the harsh African environment. Scientific observations in the 1940s verified that occurrence of skin diseases was scarce in populations using shea butter." *Alaffia Agbanga, Cooperative website*

"For thousands of years local healers have used the pasty solid to protect small wounds, heal infections, and soothe the aches of sprains and strains. Moreover, they prescribe it as a decongestant and an arthritis treatment." *Lost Crops of Africa 2006*

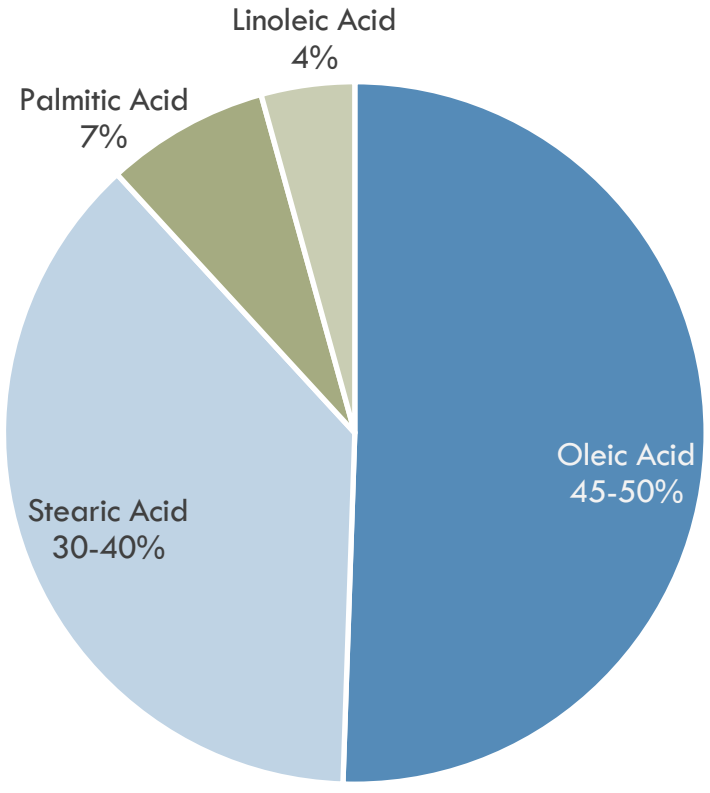
"The history of shea as a precious commodity can be traced back to ancient Egypt, where shea butter was an continues to be used to protect the skin and hair against the fierce sun and the hot dry winds of the African desert and savannah… used as a treatment for rheumatism… Local healers have also used shea butter to relieve inflammation of the nostrils and nasal congestion…used for soothing and accelerating healing after circumcision… Pregnant African women cover their selling bellies to prevent stretch marks; after birth, the women, massage their babies from head to toe with it." *W.G Goreja, 2004*

Source: https://www.agbangakarite.com; Shea Butter: The nourishing properties of Africa's best-kept natural beauty secret, 2004

Shea's fatty acid structure makes it very beneficial to human skin

FATTY ACID COMPOSITION OF SHEA

% averages



CONSTITUENTS	ROLE IN COSMETICS
OLEIC ACID	Anti-inflammatory, regenerating effect
STEARIC ACID	Reserves moisture and flexibility
LINOLEIC ACID (VITAMIN F)	Regulates moisture
VITAMIN A	Stimulates collagen production
VITAMIN E	Delays aging, improves circulation

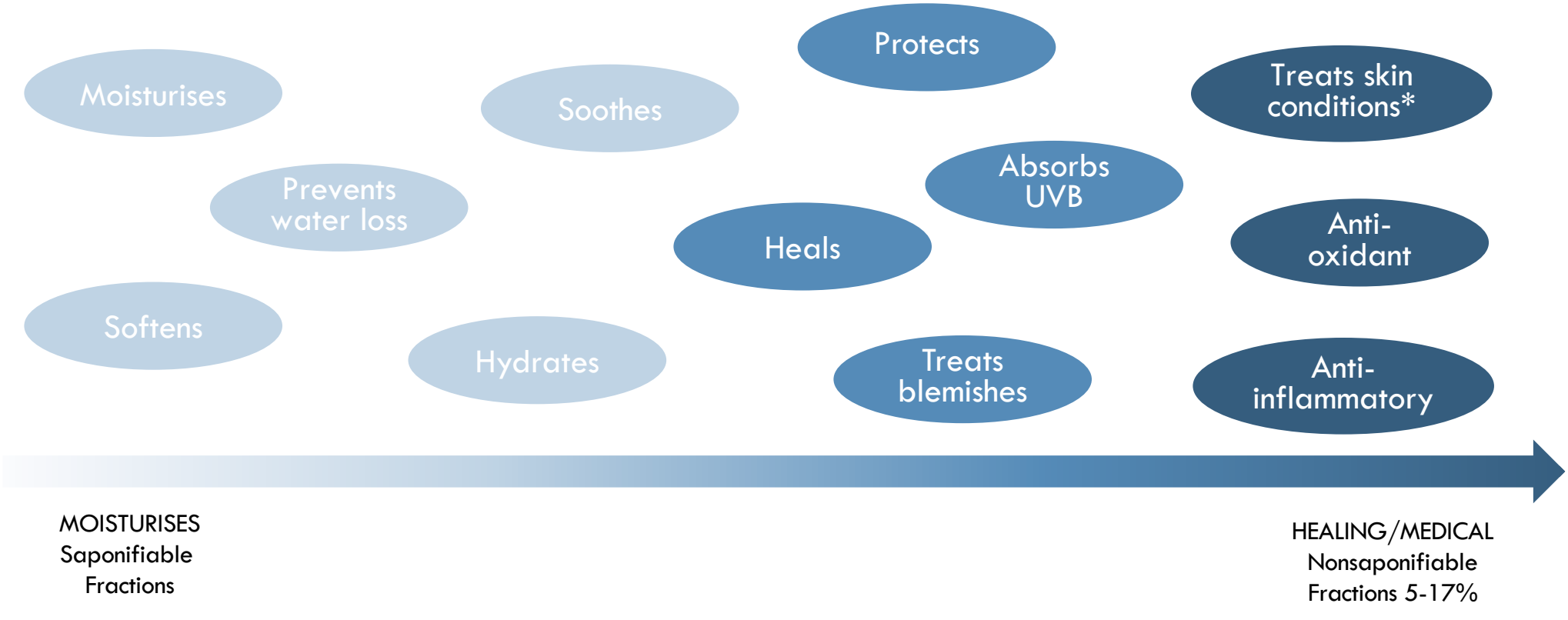
Shea's fat structure is similar to human skins "Natural Moisturising Factor" (NMF)

Source: various published articles; Coriolis analysis

Shea butter both moisturises and heals

SHEA COSMETIC PROPERTIES AND CLAIMS

Model



**Can be used to treat wrinkles, sunburn, eczema, frost bite, itching, wounds, insect bites, skin allergies. Source: various articles*

Shea is used in butter form as a beauty product, both "unrefined" and minimally processed ("raw")

UNREFINED SHEA BUTTER

RAW SHEA BUTTER/MINIMALLY PROCESSED

Source: various company websites; Coriolis analysis. Photo credit: Pixabay CC0; fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

Shea is used as a headline ingredient on the front of moisturises and shampoo labels

MOISTURISER

SHAMPOO

Source: various company websites; Coriolis analysis. Photo credit: Pixabay CC0; fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

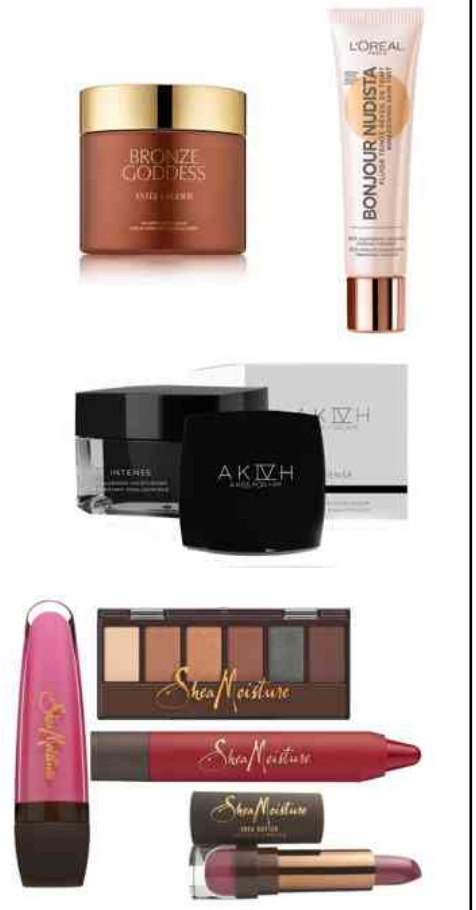
Shea is used as a named ingredient, called-out on many other cosmetic products, from body washes, to soaps and cosmetics

BODY WASH

THERAPEUTIC CREAMS

SOAP

COSMETICS



Source: various company websites; Coriolis analysis. Photo credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

Premium global brands offer full product ranges featuring shea

THE BODY SHOP®

L'OCCITANE
EN PROVENCE

Source: Company websites; Coriolis analysis. Photo credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

As an example, shea is a listed ingredient in over sixty health and beauty products at Woolworths Australia

SELECT EXAMPLES: WOOLWORTHS AUSTRALIA RANGE OF PRODUCTS CONTAINING SHEA

Note: Not all 60 shown. Source: Woolworths.com.au, Nov 2018; Coriolis analysis. Photo credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

2.2.3 Finally, there are a wide range of other uses for shea butter, accounting in total for 5-10% of globally traded volume

1

CHOCOLATE

80-85%

Used as key alternative ingredient to cocoa butter

Chocolate
Confectionery

2

HEALTH & BEAUTY/COSMETICS

10-15%

Moisturising and beauty enhancing

Shea butter
Body wash
Skincare creams
Soap
Cosmetics

3

INGREDIENT/OTHER

5-10%

Low cost, functional vegetable fat

Pastry
Sweetening biscuits
Bread and rolls
Pizza
Ice cream
Powders
Nutrition products
Neutraceuticals/Pharmaceuticals

Source: various published articles; Coriolis analysis. Photo Credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes; Coriolis purchased

Shea is used as an ingredient in combination with other vegetable fats and oils to improve performance and reduce cost

PRODUCTS	Shortening, fats, oils, margarines	Fats, oils, powders	High purity oils and specialty powders
FUNCTION	Less fat, more lift, lighter	Less fat, no trans fats, reduced saturation	Anti-inflammatory, plant based omegas, lower cholesterol, nutrients (e.g. choline)

Source: company websites; Coriolis analysis

THE $40M OPPORTUNITY

03

+ Domestic

+ Export

North West Queensland has a A$40m shea nut opportunity

- There are four broad market opportunities for Australian-produced shea butter; the addressable market for Australian shea is estimated at A$40m+ across these four opportunities
  1. First, minimally processed shea butter products can be produced in small volumes and sold locally and regionally
  2. Second, Australian produced shea will find a ready market with Australian cosmetics and beauty product producers and marketers
  3. Third, larger multinationals will welcome shea butter made from trusted, efficient and sustainable Australian ingredients
  4. Finally, Australian shea butter can be sold into the world market at world prices
- There is a lot of available margin between consumer retail prices for shea products and the raw shea butter commodity price; as production volumes increase, Australian produced shea can address larger, more competitive markets
- North West Queensland can bring significant areas into shea production before it has to meet world commodity prices

There are four broad market opportunities for Australian-produced shea butter

HYPOTHETICAL EXAMPLES FOR ILLUSTRATION

1

Raw Shea Butter Products Made In Australia

- Very simple to produce
- Can be produced at very low volumes ("in a shed")
- Can be sold regionally and nationally
- Initially into niche markets (e.g. spas, souvenir shops)

2

Unique Australian Products Containing Shea

- Australia has a diverse range of smaller cosmetics and beauty producers
- Most leverage "unique Australian" ingredients
- This group would welcome Australian produced shea butter for use in their products

3

Multinationals Using Trusted Australian Ingredients

- Global multinationals struggle with Africa supply for a wide range of reasons
- A number of cosmetics and beauty products are manufactured in Australia
- These firms would welcome Australian supply

4

Undifferentiated Commodity Shea Butter

- Australian shea butter can sell into world markets at the world price
- The shea butter price is driven by the price of other vegetable fats (particularly cocoa and palm)

Source: Coriolis analysis. Photo credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

The addressable market for Australian shea is estimated at A$40m+ across these four opportunities

MARKET SIZE MODEL FOR AUSTRALIAN PRODUCED SHEA BUTTER

As given; nominal/hypothetical 2017

	1 Simple "Raw" Shea Butter Products Made In Australia	2 Australian Beauty & Cosmetic Products Containing AU Shea	3 Multinationals Using Trusted Australian Ingredients	4 Undifferentiated Commodity Shea Butter
Incremental addressable market volume in tonnes	0-200t	201-1,000t	1,001-10,000t	10,001+
Average realised wholesale value per tonne from this market	$10,000	$5,000	$3,000	$2,500 *(+14% to Africa)*
Therefore range of market values achieved for AU produced shea	$1-2m	$1-5m	$1-30m	*World market can effectively absorb any volume at the quality adjusted world price*

~$40m+ addressable market for Australian produced shea

Source: Coriolis analysis and estimates

First, minimally processed shea butter products can be produced in small volumes and sold locally and regionally

1. **Raw Shea Butter Products Made In Australia**
2. Unique Australian Products Containing Shea
3. Multinationals Using Trusted Australian Ingredients
4. Undifferentiated Commodity Shea Butter

- Shea nuts can be processed and shea butter extracted with very low technology *(as this lady demonstrates)*
- Unlike some crops (e.g. biofuels), this enables commercial production at small "farm" or "shed" operational scale

- Raw shea butter is itself a cosmetic product in its own right
- Bagged "bar" or pottle packaging is simple and can be done manually (similar to olive oil)
- Enabling production and sale of initial quantities

- Simple processing and simple packaging enable simple route-to-market
- Can be sold through multiple channels
  - On-site ("farmgate" or "cellar door")
  - Locally (markets or local retailers)
  - Regionally (souvenir shops)
  - Service providers (spas, resorts, hotels)

Source: Coriolis analysis. Photo credit: CC A 20. G (Treeaid); fair use/fair dealing; low resolution; complete product/brand for illustrative purposes

Second, Australian produced shea will find a ready market with Australian cosmetics and beauty product producers and marketers

1. Raw Shea Butter Products Made In Australia
2. **Unique Australian Products Containing Shea**
3. Multinationals Using Trusted Australian Ingredients
4. Undifferentiated Commodity Shea Butter

EXAMPLES OF AUSTRALIAN BEAUTY BRANDS

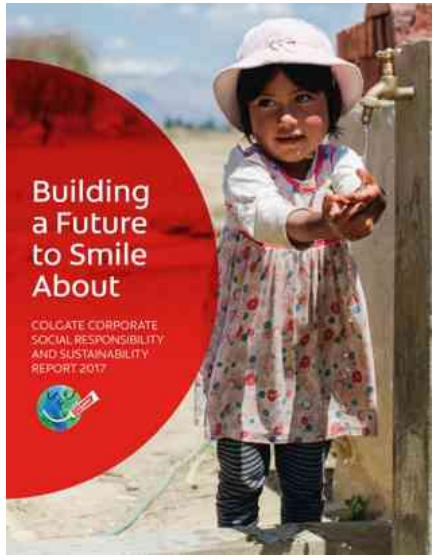
- Australian cosmetics market was worth ~$5b in 2015, projected to grow to $7.8b by 2020[1]
- Australia has a very large and diverse range of smaller cosmetics and beauty producers
- Most leverage "unique Australian" ingredients and seek organic/natural supply
- This group would welcome Australian produced shea butter for use in their products

1. Mordor Intelligence. Source: Coriolis analysis

Third, larger multinationals will welcome shea butter made from trusted, efficient and sustainable Australian ingredients

1. Raw Shea Butter Products Made In Australia
2. Unique Australian Products Containing Shea
3. **Multinationals Using Trusted Australian Ingredients**
4. Undifferentiated Commodity Shea Butter

EXAMPLE: SELECT REPORTING MEASURES FROM COLGATE PALMOLIVE GLOBAL CORPORATE SOCIAL RESPONSIBILITY AND SUSTAINABILITY REPORT 2017



Climate Change Policy	Ingredient Safety Policy	No Deforestation Policy
Human Rights Policy	Anti-Bribery Ethics Policy	Social Supply Chain Management Policy
Palm Oil Policy	Policy Against Child Labour	*NO COMPLIANCE CHALLENGES IN AUSTRALIA*

ANNUAL REPORTING ON…*

Certified Palm Oil
Certified Palm Kernel Oil
Certified Palm Oil and PKO derivatives
Total Certified Palm Oils (Palm, PKO, Derivatives)
Palm Oil traceable to the mill
Palm Kernel Oil traceable to the mill
Palm Oil traceable to Plantation
Palm Kernel Oil traceable to Plantation
Palm Derivatives Traceability to First Refiner
Palm Derivatives Traceability to Mill
Palm Suppliers with No Deforestation
Palm Suppliers with Grievance Process

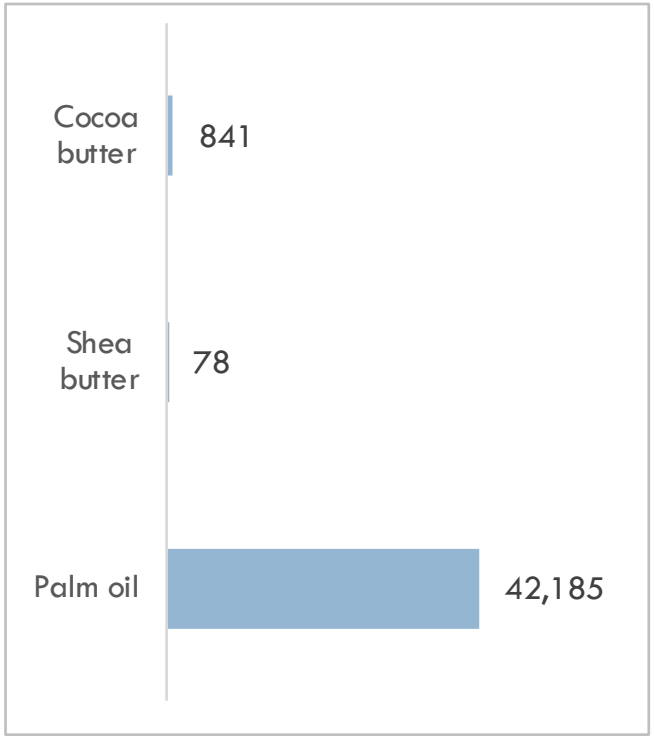
- Global multinationals struggle with African shea supply for a wide range of reasons
- Most major cosmetics and beauty firms use shea
- These firms would welcome Australian supply as it would not exacerbate the problems listed here

** No measures yet even exist for shea and developing and implementing these would be challenging. Photo credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes. Source: various articles; Coriolis analysis*

Finally, Australian shea butter can be sold into the world market at world prices

1. Raw Shea Butter Products Made In Australia
2. Unique Australian Products Containing Shea
3. Multinationals Using Trusted Australian Ingredients
4. **Undifferentiated Commodity Shea Butter**

GLOBAL EXPORT VOLUME; 000; 2016/17



AVERAGE EXPORT VALUE; US$/t; 2016/17

- There is a mature and well developed global market for vegetable oils and fats
- A number of other Australian oils and fats already sell into this market (e.g. tallow; canola; olive oil; etc.)
- The shea butter price is driven by the price of other vegetable fats (particularly cocoa butter)
- Growing demand for cocoa butter substitutes will support shea butter prices going forward
- Australian shea butter can sell into world markets at the world price
- Many close markets to Australia buy shea butter currently (e.g. Malaysia, Indonesia, India, and China)

Source: UN Comtrade; Coriolis classification and analysis

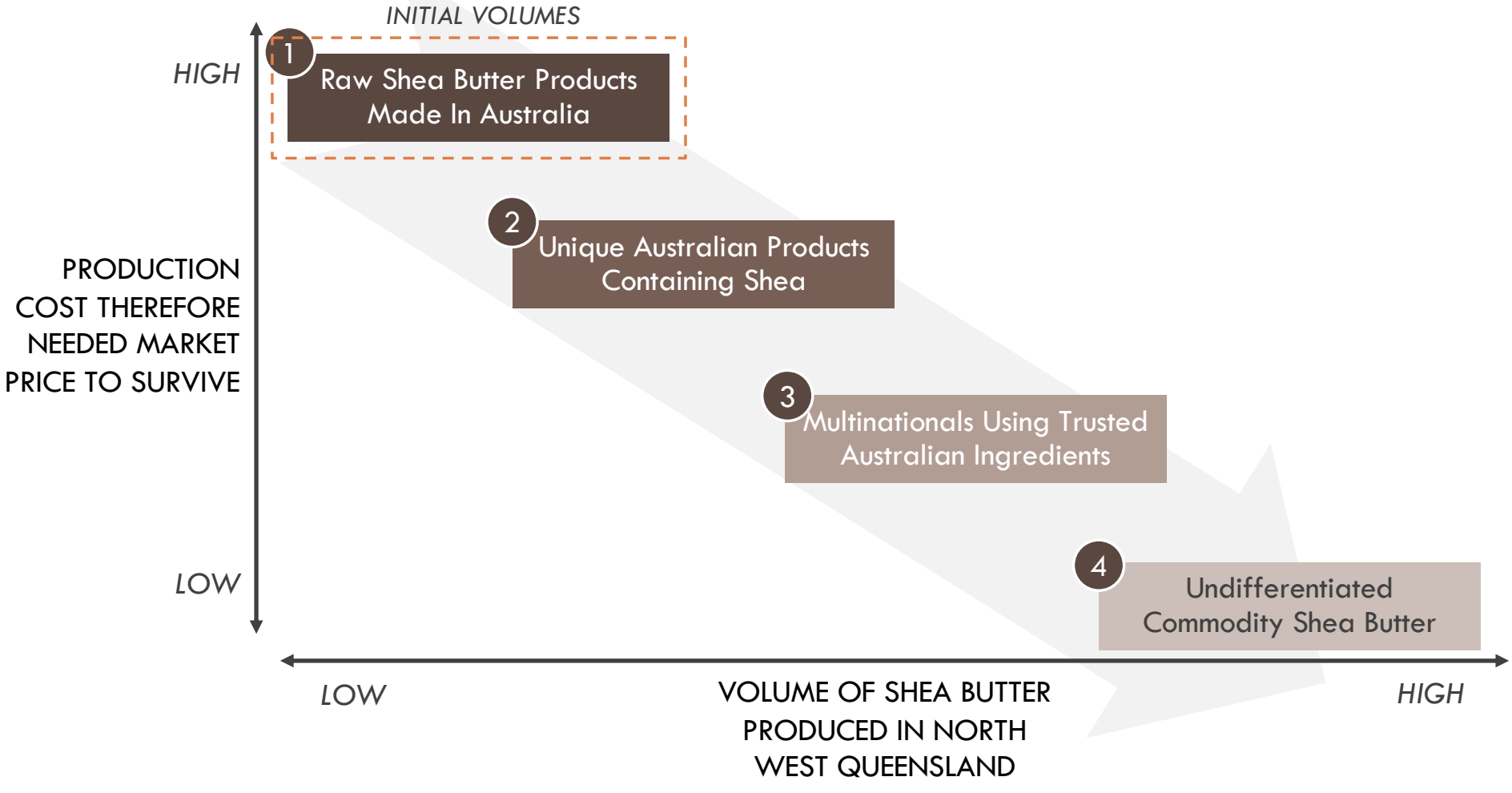
There is a lot of available margin between consumer retail prices for shea products and the raw shea butter commodity price

AVERAGE PRICE PER TONNE: RAW SHEA BUTTER VS. RETAIL SHEA PRODUCTS

A$/tonne; as of late 2018 except for CIF price which is 2017

Photo credit: fair use/fair dealing; low resolution; complete product/brand for illustrative purposes. Source: various online shopping sites; UN Comtrade; Coriolis analysis

As production volumes increase, Australian produced shea can address larger, more competitive markets



Source: Coriolis analysis

North West Queensland can bring significant areas into shea production before it has to meet world commodity prices

MODELLING REALISED SHEA BUTTER VOLUMES RELATIVE TO MARKET CAPACITY

Total shea butter produced; hectares; butter t/tree; nominal/hypothetical 2017

BUTTER YIELD PER HECTARE (T/ha)

AREA (ha)	0.3	0.4	0.5	0.6
500	200	200	200	300
2,000	700	900	1,000	1,300
16,000	5,500	7,000	8,000	10,000
20,000	7,000	9,000	10,000	13,000

TOTAL SHEA NUTS PRODUCTION (in tonnes)

1	Raw Shea Butter Products Made In Australia	0-200t
2	Unique Australian Products Containing Shea	201-1,000t
3	Multinationals Using Trusted Australian Ingredients	1,001-10,000t
4	Undifferentiated Commodity Shea Butter	10,001+

Note: Rounded; greater detail in calculation. Source: Coriolis analysis, modelling and estimates

NORTH WEST QUEENSLAND CAN DELIVER

04

+ Poised for success

+ Clear next steps

North West Queensland is poised for success in shea

- North West Queensland has the land, water and resources required for success in shea
- North West Queensland combines a safe and trusted modern economy, with African climatic conditions, that is close to key markets
- North West Queensland can succeed against the competition in shea
- Developing shea in North West Queensland requires long term thinking and investment
- Three specific next steps are required to realise the North West Queensland shea opportunity
  1. First, the best available genetics need to be identified and introduced
  2. Second, production systems optimised to local conditions need to be developed
  3. Third, efficient "right sized" shea butter processing and marketing needs to be developed as the industry grows

North West Queensland has the land, water and resources required for success in shea

- Large total area 375,486 km^2
- Over 28m hectares of agricultural holdings in the region
- Diverse climatic conditions
- Low cost land currently underutilised
- Fertile soils suitable for agriculture

- Plentiful seasonal rainfall
- Multiple existing dams in the region
- Numerous additional dams proposed or in progress
- Proposed dams will be transformative to regional agriculture

- World class supply chains
- Easy access to Port of Townsville and Cairns Airhub
- Ongoing investment in infrastructure
- Skilled and educated regional population
- Readily available equipment, systems and support services

Photo credit: CC BY-SA 3.0 (Ravenspear82); purchased

NW Queensland combines a safe and trusted modern economy, with African climatic conditions, that is close to key markets

Efficient, world class, modern production system

- Very large, highly efficient farms
- World class agriculture production systems and proven capability
- Modern distribution infrastructure
- Well funded science and research
- Highly skilled at producing arable crops at scale in an arid climate
- Skilled and educated farmers
- Long history of agriculture and global trade in QLD

Crops suited to regional conditions and climate

- Warm semi arid and tropical savanna climates with some warm desert
- Long sunshine hours
- Significant new production possible
- Counter seasonal production
- Supplied to world market by climatic peers

On the doorstep of East and South East Asia

- Strong demand from high value markets
- Excellent proximity to high demand markets in East & South-East Asia
- Short transport times and distances
- In the same (or similar) time zones
- Free Trade Agreements with most key trading partners

Modern, efficient economy with strong rule of law

- Protected by Australia's island location and strong biosecurity
- Strong reputation with consumers as a safe and secure food producer
- Strong investor protection, highly ranked in "ease of doing business" and rule-of-law
- AAA sovereign risk rating

Photo credit: Dollar Photo purchased by Coriolis Research

North West Queensland can succeed against the competition in shea

STRENGTHS

- Arid tropical climate well suited to many African crops, including shea trees
- Large amounts of seasonal water relative to many climatic peers
- Isolated island location with strong biosecurity; free from many diseases and pests
- Large area the size of Germany or Japan currently being used for cattle
- Low land cost relative to other Australian locations
- "Brand Australia" known and trusted by global consumers
- Large, high productivity farms in Queensland relative to peer group
- Proven capabilities at large scale mechanised agriculture
- Highly skilled, technically competent workforce
- Proven track record in new crop development (e.g. almonds, macadamia, pecans, avocados)

WEAKNESSES

- High cost country relative to Africa, India and Asia; success requires highly efficient production through mechanisation and large efficient systems
- Lack of large supply of low cost locals or "guest workers" (unlike some countries)
- Low regional population; relatively high seasonal labour costs
- Lack of genetics specifically bred for local conditions
- Lack of nut growing capabilities in region
- Good roads, but relatively long transport distance to port
- Low/no historical investment in large scale dams and irrigation projects in region
- Strong environmental protection rules and regulation limit virgin/regrowth land clearing
- Limited support services available directly in region

OPPORTUNITIES

- Continued growth of the middle class in Asia
- Growing global interest in healthy baking ingredients
- Continued growth of chocolate industry
- Growth of natural and sustainable cosmetics ingredients
- Potential to utilise waste streams (nut oil cake used as animal feed)
- Regular, ongoing corruption, political strife, civil war, revolution, rebellion and disease outbreaks (e.g. Ebola) in Africa

ISSUES/THREATS/RISKS

- Import / varietal selection / appropriate genetics
- Disease outbreaks
- Climate variability
- Changing global trade flows and trade wars
- Conflicting agenda and objectives of various government agencies
- Changing foreign phyto-sanitary protocols and regulations and their interpretation
- Politics and geopolitics

Source: Coriolis analysis

Long term thinking and investment is typical of new tree crops in Australia

					TODAY
MACADAMIA	Nut is collected and eaten in Queensland by first peoples	1857 Tree is named by German-Australian botanist Ferdinand von Mueller after John Macadam	1888-1946 Pioneering development work done in Australia and Hawaii to develop scale production model	1946-current Australian industry grow and invest and has 3,000ha of almonds	Australia produces 50,000t of macadamia worth $260m at farmgate
ALMOND	1836 Almonds arrive in Australia on Duke of York (ship) and planted on Kangaroo Island by sealers	1900's Almond farming emerges with support from SA Department of Ag and Californian developed genetics	1950's Almond yields begin to increase and grow dramatically for next 70 years	1987 Australia produces 4,400t of macadamia worth A$14m at farmgate	Australia has 40,000 ha of almonds and is projected to deliver revenue of A$1b
AVOCADO	1853 Avocado is introduced to Australia as novelty fruit for gardeners	1930's Superior avocado genetics developed in California introduced and commercial production begins	Late 1970's Industry growth begins to take off following large new planting and growing consumer aceptance	2000's+ Australian avocado industry continued to achieve strong growth driven by high market returns	Australia produces 66,000t of avocados worth $400m

Source: Coriolis from past work and a wide range of published sources

Three specific next steps are required to realise the North West Queensland shea opportunity

- The best global shea genetics are not currently in Australia
- While shea is domesticated, it has not been extensively bred for high yield production like other key tree crops
- The best genetics for North West Queensland conditions need to be identified and introduced
- Grafting and rootstocks need development

- Existing plantation systems in Africa are early stage relative to modern Australian tree crop production (e.g. almonds)
- Shea is typically farmed at low densities over large areas, while existing nut tree systems focus on high tree densities
- The best production system for NW Queensland conditions needs to be developed

- Shea nut processing is well understood and multiple suppliers exist for required plant and equipment
- Shea nut processing can and does occur at scales ranging from one person to large export focused factories
- Small scale processing can be done with simple equipment in a shed; large African export plants cost ~US$30m

Source: Coriolis analysis. Photo credit: CC-BY-SA-2.5, (Sominar Uni Hohenheim); purchased by Coriolis

First, the best available genetics need to be identified and introduced

2. PRODUCTION SYSTEMS

3. PROCESSING & MARKETING

Situation creating opportunity	***Potential investment theme***	***What you would need to believe***
- Shea grows in 22 countries and covers 4 million square kilometres of area (an area half the size of Australia) - Like the 22 countries that grow shea, NW Queensland has warm semi arid and tropical savanna climates - NW Queensland is a large region, similar in size to Germany or Japan, and is currently using its land for tropical cattle breeding and backgrounding rather than crop production - Climatic peer group countries across sub-Saharan Africa produce large amounts of shea under these conditions	Secure genetics in Australia	- Shea could be imported through biosecurity processes and grown in Australia - Shea could be successfully grown in a plantation - Drivers of variable shea yields could be understood and stabilised - Shea grown in Queensland conditions would produce the desired oil/fat levels for processing

Source: Coriolis analysis

The shea tree has historically been seen as "hard to farm"

- "[Shea] has been called **temperamental** and **awkward** and has only recently, for instance, been brought into plantations like oil palm or olive… Over the last 50 or so years there have been sporadic attempts to establish plantations, but in the past none was ever followed through to a successful conclusion. Indeed, only now do they seem commercially promising. For that, there is a simple explanation: The trees are very **slow to mature**. Moreover, the search continues for regular-fruiting varieties that can be relied on to **yield fruit consistently** year after year. It is little wonder, therefore, that many researchers basically gave up on this species. Most concluded that large-scale plantings would never be viable. In their frustration, they dubbed the shea tree "untamable." *Lost Crops of Africa, 2006*

- "Where people have tried planting [Shea] they have commonly employed a regular grid pattern with 10m x 10m spacing. Shea seeds germinate easily when fresh but lose this ability quickly. The seedlings grow a long taproot, which endows **great drought resistance**, but makes them **difficult to transplant**… **Trees raised from seed mature very slowly**, bearing their first fruits after 12-25 years and taking 30-50 years to achieve full productivity… Success with cuttings has been achieved, though methods presently seem challenging except with good skills and facilities. Grafting, though difficult and often inefficient, also works if practiced carefully. Air-layering has also been successful, yet it too has proven difficult to pull off reliably in practice. *In vitro* propagation is also reported." *Lost Crops of Africa, 2006*

Source: Lost Crops of Africa; Coriolis analysis

Recent breakthroughs have reduced shea tree gestation times and facilitated larger plantations

- "Nigerian Institute for Oil Palm Research (NIFOR), through its research on the Shea tree, has reduced its gestation period from between 15 and 30 years to seven years before it starts fruiting." *Mrs. Mobola Sagoe, Vice-President, National Association of Shea Butter Producers (Nigeria), quoted in The Sun (Nigeria), July 27, 2017*

- "The government has started the planting of Shea butter trees in various zones, they have planted 10,000 Shea butter trees in zone B, the plan is to plant 10,000 Shea butter trees in all the zones, they have started with zone B, they will extend to other zones." *Hajiya Aisha Mohammed, Niger State Public Private Partnership Officer, July 2018*

- "Through a collaboration between the Raw Materials Research and Development Council and the National Centre for Genetic Research and Biotechnology, efforts have been underway [in Nigeria] since 2010 to establish Shea tree plantations to reduce pressure on wild trees and to introduce technologies to mechanize local grinding and kneading methods." *World Agroforest Centre, 2018*

Source: various published articles; Coriolis analysis

Second, production systems optimised to local conditions need to be developed

Situation creating opportunity	***Potential investment theme***	***What you would need to believe***
- Export shea are currently only produced in sub-Saharan Africa (using low cost labour) - Australia has a global scale crop and nut industry and associated support sectors (e.g. harvesting machinery) - Australia has experience producing almonds, macadamias, hazelnuts, pecans and many other tree nut species - Australia is a developed country with high cost labour that achieves export success through efficient production of crops on large farms using mechanised production systems and large scale, highly efficient supply chain logistics - NW Queensland is a large, remote region currently focused on cattle, large scale mining and tourism - Mount Isa (regional centre) is an 11 hour drive from major population centres and the Port of Townsville - The region has good transport infrastructure and a widespread network of regional airports - The region has rail and a reliable central electrical grid in most key areas; some large properties are more remote - However, as a relatively remote region, it lacks specialised services that need to be "brought in" from other areas - There is a limited pool of skilled producers of large scale crops in the region directly (but many elsewhere)	Implement Low Cost Production Suited to Regional Conditions	- Mechanically harvested shea from Australia will be economically competitive with hand harvested shea from Africa - Modern nut orchard management systems and practices would produce competitive results in shea nut farming - Existing Australian nut farming systems can be adapted for shea in NW Queensland - A low cost shea nut crop production system adapted to local conditions can be developed relatively quickly - Fallen shea nuts can be efficiently collected using a "sweeping" style pecan-harvester (or similar)
	Organise Distribution & Supply Chain Logistics	- Shea can be graded, processed, handled and stored in the storage infrastructure used for other nuts in Australia - Cost competitive storage infrastructure can be put in place relatively quickly
	Implement with a Skilled & Capable Team on the Ground	- Skilled nut farming operators from outside NW Queensland can be attracted to the region to grow shea - Local farmers are able to upskill

Source: Coriolis analysis

Australian shea operations will need low cost production systems to balance out lower returns per hectare than other tree nuts

DRIVERS OF PRODUCTION COST PER HECTARE

VERY LOW COST LAND + LOW LABOUR MECHANICAL HARVESTING + LOW MAINTENANCE

+

LOW PLANTATION ESTABLISHMENT COSTS

Production system costs need to be low relative to other nut crops…

DRIVERS OF GROSS RETURNS PER HECTARE

LOWER YIELDS + LOWER VALUE PER TON

LOWER TREE DENSITIES

LOWER YIELDS PER TREE

LONGER TO REACH MATURITY

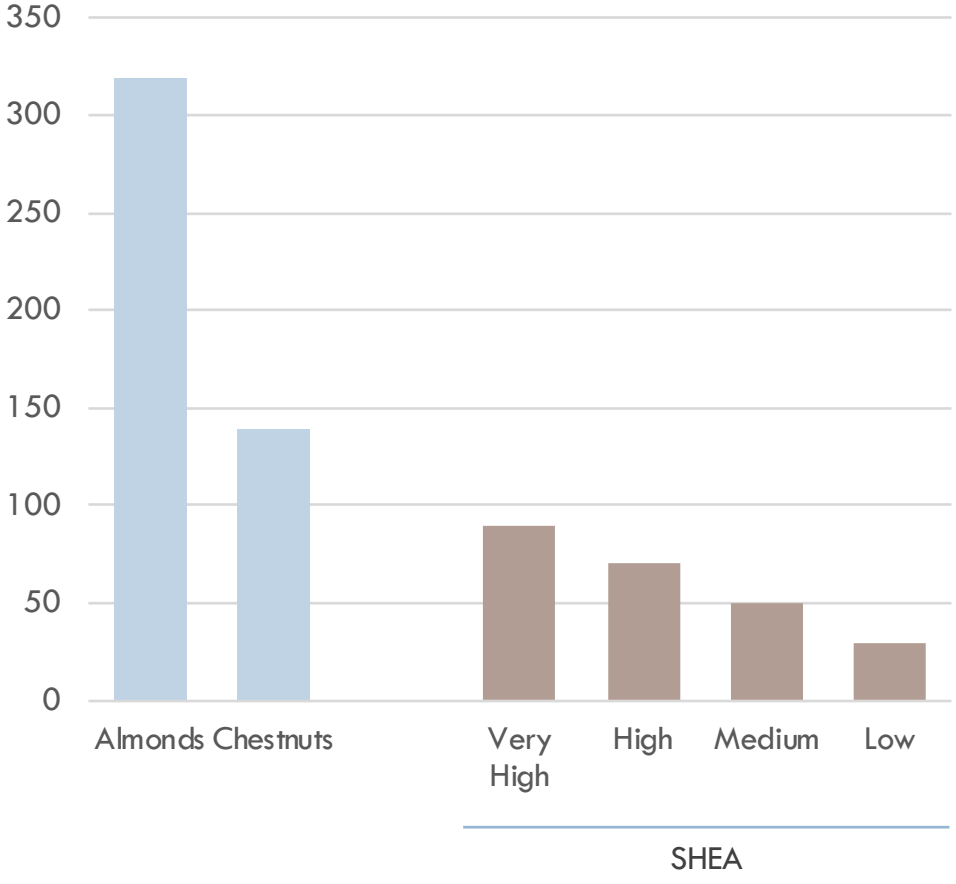
…to balance the lower returns relative to other tree crops (but not arable)

Source: Coriolis analysis

Shea plantations will have lower tree densities and lower yields per hectare than other nut crops in Australia

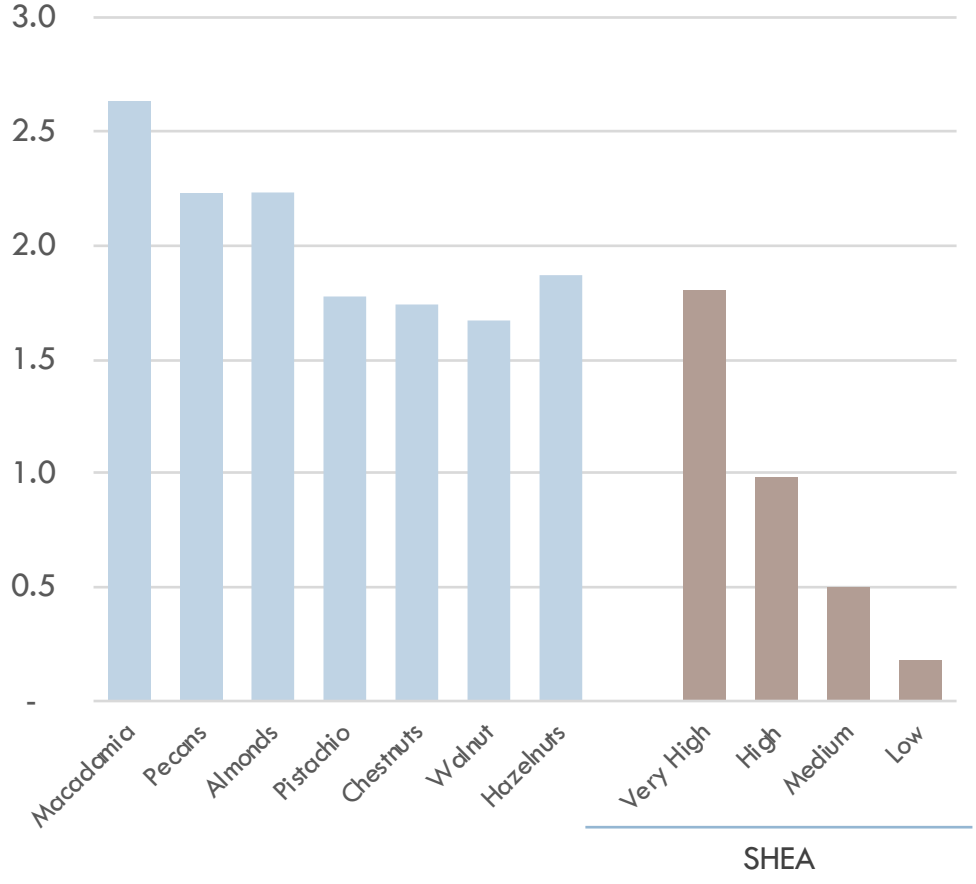
AVERAGE TREE DENSITY PER HECTARE

Trees/ha; 2017 or modelled



AVERAGE NUT YIELD PER HECTARE

Tonnes/ha; 2017 or modelled



Source: Australian Nut Industry Council; Hort Innovation AU; Coriolis analysis, modelling and estimates

Realised per hectare yields are sensitive to tree density and nut yield; Australia need to target at least 0.3-0.6t/ha shea butter

MODELLING REALISED SHEA NUTS & BUTTER PRODUCTION PER HECTARE

Kg/tree; trees/ha; nominal/hypothetical 2017

NUT YIELD PER TREE (Kg/tree)

TREE DENSITY (Trees/ha)	6kg	10kg	14kg	20kg
30	0.2	0.3	0.4	0.6
50	0.3	0.5	0.7	1.0
70	0.4	0.7	1.0	1.4
90	0.5	0.9	1.3	1.8

REALISED SHEA NUTS PER HECTARE (in tonnes)

BUTTER YIELD PER TREE (Kg/tree)

2.1kg	3.5kg	4.9kg	7.0kg
0.1	0.1	0.1	0.2
0.1	0.2	0.2	0.4
0.1	0.2	0.3	0.5
0.2	0.3	0.4	0.6

Target

REALISED SHEA BUTTER PER HECTARE (in tonnes)

Note: Rounded; greater detail in calculation. Source: Coriolis analysis, modelling and estimates

Realised revenue is estimated at $3.4k-6.3k per hectare at low volumes

MODELLING REALISED STAGE I SHEA NUTS & BUTTER VALUE PER HECTARE

A$/ha; based on butter kg/tree x trees/ha; nominal; 2017

See p80—87 for details of Stage I

STAGE I - LOW VOLUMES/HIGH PRICES (USES $10,000t)

BUTTER YIELD PER TREE (Kg/tree)

TREE DENSITY (Trees/ha)	2.1kg	3.5kg	4.9kg	7.0kg
30	$ 630	$ 1,050	$ 1,470	$ 2,100
50	$ 1,050	$ 1,750	$ 2,450	$ 3,500
70	$ 1,470	$ 2,450	$ 3,400	$ 4,900
90	$ 1,890	$ 3,150	$ 4,400	$ 6,300

Target

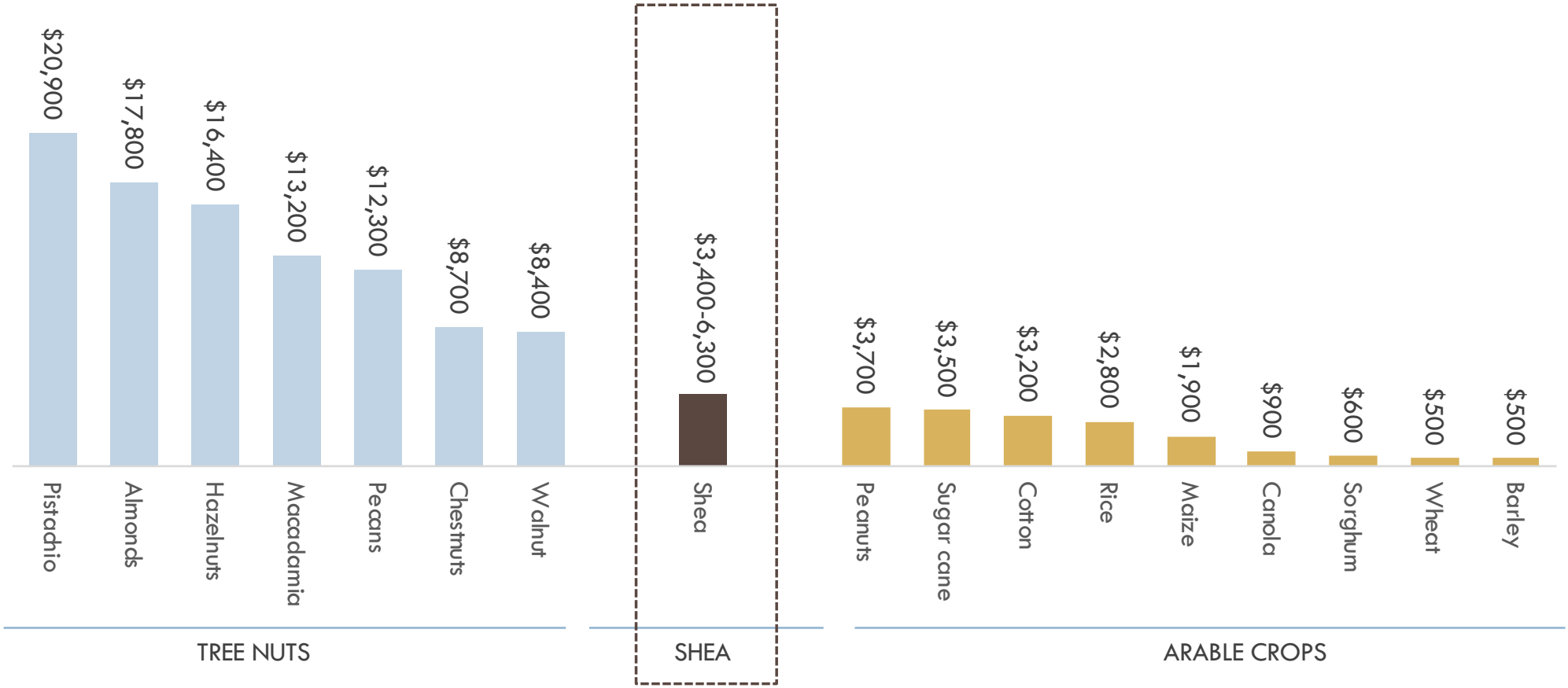
GROSS SHEA BUTTER REVENUE PER HECTARE (A$/ha)

Note: Rounded; greater detail in calculation. Source: Coriolis analysis, modelling and estimates

Initial shea returns per hectare will be lower than other tree nuts, but higher than many arable crops

"FARMGATE" REVENUE PER HECTARE

A$/hectare; 2017 or modelled

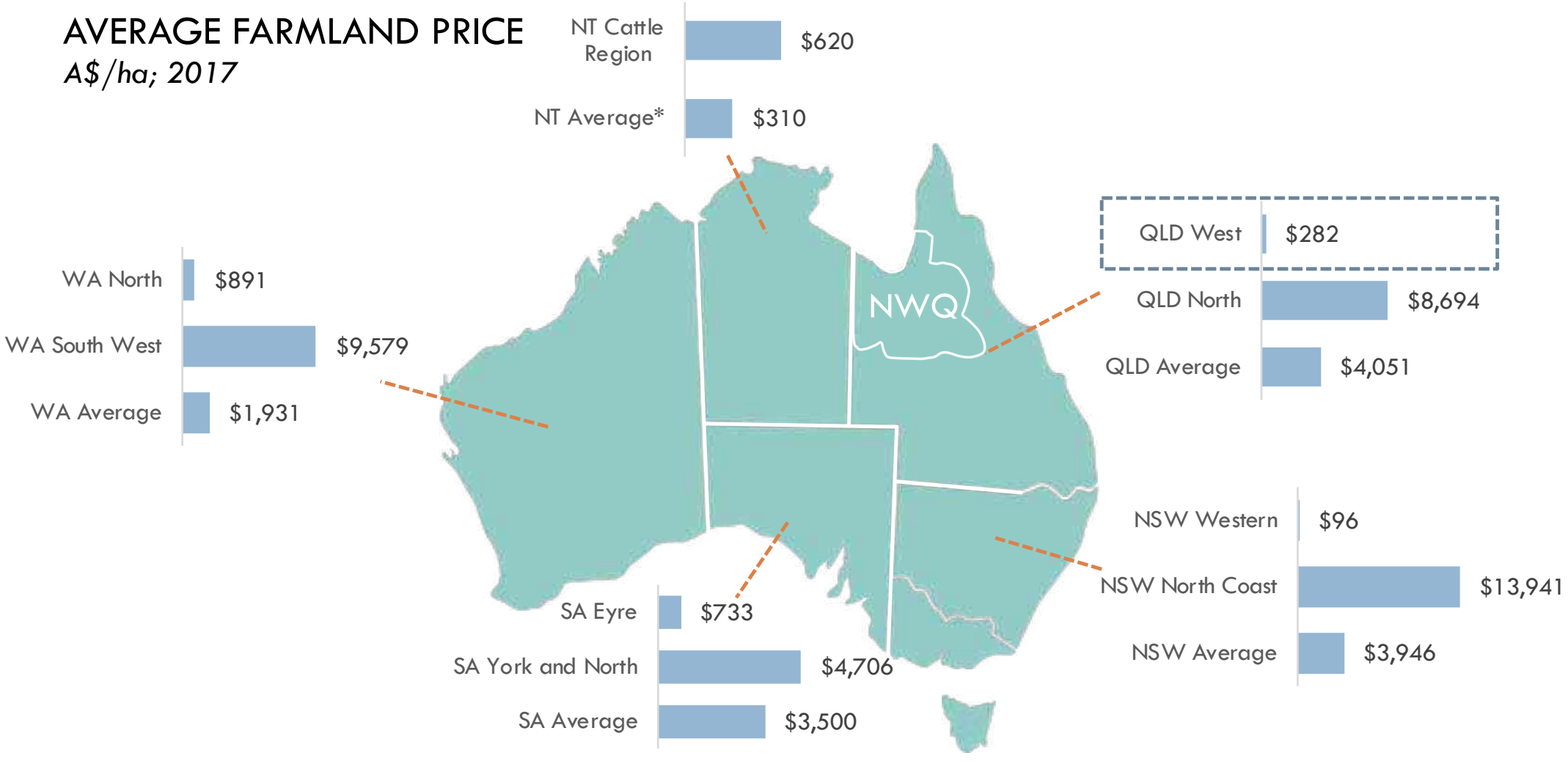


Note: Rounded. Source: Australian Nut Industry Council; Hort Innovation AU; ABS; ABARES; Coriolis analysis, modelling and estimates

$3.4k-6.3k per hectare per year provides a good return on current regional land prices of $282 per hectare

AVERAGE FARMLAND PRICE

A$/ha; 2017



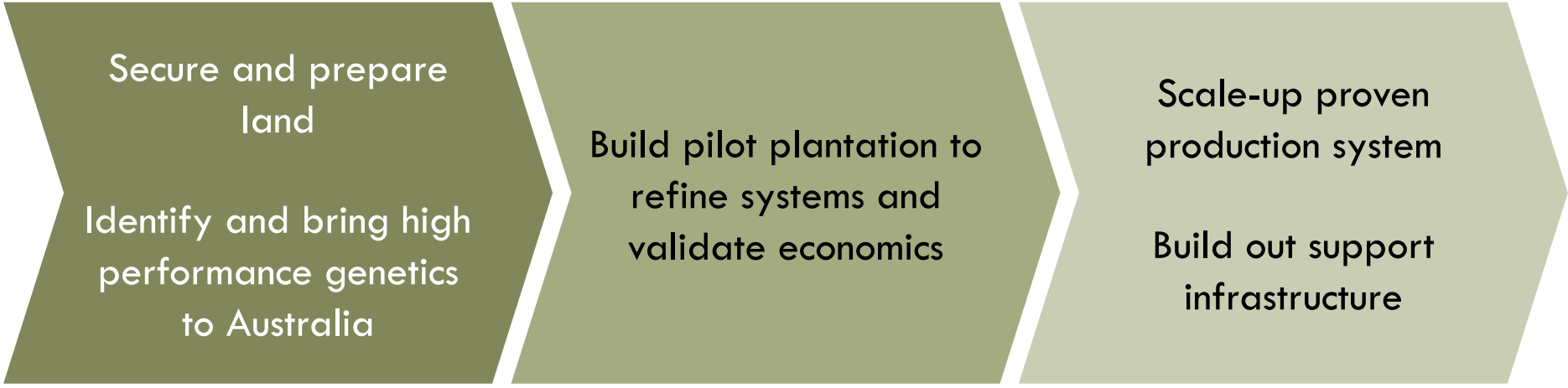
**NT Median Indexed; Source: Rural Bank, Australian Farmland Values; Coriolis analysis*

Third, efficient "right sized" shea butter processing and marketing needs to be developed as the industry grows

Situation creating opportunity	*Potential investment theme*	*What you would need to believe*
- Currently all shea used for for cosmetics, confectionery and baking is imported into Australia - Some of the major shea producing countries are currently high risk, with endemic corruption, limited political or economic stability and poor infrastructure - Some of the major producers have weak "country brands"	Develop Clear "Unique Selling Proposition" (USP) for NW Queensland Shea	- Shea can be differentiated and is not a pure commodity (alternatively NW Queensland can be lowest cost producer) - NW Queensland produced shea will be different in some marketable way - A significant percent of buyers value soft characteristics such as "sustainable," " clean and green" and "Brand Australia"
- Minimally processed shea butter products can be produced in small volumes and sold locally and regionally - Consumer interest in clean labels for cosmetics - Australian cosmetics market was worth ~$5b in 2015, projected to grow to $7.8b by 2020 - Australian produced shea will find a ready market with Australian cosmetics and beauty product producers and marketers	Develop Domestic Australian Market	- NW Queensland will be able to produce shea butter at competitive prices for local supply - NW Queensland produced shea will be higher quality, fresher than imported shea from Africa - A significant percent of current Australian buyers of imported shea will be willing to switch to locally produced shea and be willing to pay a some initial premium for Australian shea (locally sourced, traceable)
- Larger multinationals would welcome shea butter made from trusted, efficient and sustainable new suppliers - Significant available margin between consumer retail prices for shea products and the raw shea butter commodity price - There is a large global market for shea, valued at US$152m in 2017 and growing at 14% (20y CAGR)	Develop High Potential Shea Export Markets	- NW Queensland will be able to produce shea butter at prices that are competitive for key export customers and markets - The drivers of Australian export success in other products will be transferrable to shea and shea based products - NW Queensland produced shea will deliver higher quality product at competitive prices in world markets - A significant percent of global buyers of shea will be willing to switch to buying shea from NW Queensland

Source: Coriolis analysis

Developing shea in North West Queensland requires long term thinking and investment



- *Huge amounts of suitable land available at low prices*
- *Need to navigate significant government processes currently in place to maintain biosecurity*
- *Seeds are more easily introduced than plant material*

- *Best practice Nigerian plantations currently bear in seven years*
- *African systems will need adaptation to Australian conditions*
- *Mechanical harvesting systems from pecans (or similar) will need adaptation*

- *Longer development cycle than other major tree crops in Australia currently*
- *Risk needs to be managed carefully*
- *Requires low cost/high return development model to compensate (low input costs/low investment)*
- *Extremely low regional land costs suggests land cost returned in first harvest (i.e. land cost = one crop)*

Source: Coriolis analysis

To discuss the shea opportunity in North West Queensland please contact

ADAM WEST
Regional Director – North Region
+61 7 3330 4501
adam.west@daf.qld.gov.au

Queensland Department of Agriculture and Fisheries
North Region Office
Townsville Regional Office
9-15 Langton Street, Garbutt QLD 4814
Australia

APPENDICES 05

+ Potential Commercial Partners
+ Glossary

AAK

WHO ARE THEY?

CEO/MD:	Fredrik Nilsson
Address:	Skrivaregatan 9 SE-215 32, Malmo, Sweden
Phone:	+46 40 627 83 00
Established:	1871/2005
Website:	https://aak.com
Revenue:	SEK26.4m (2017)
OP:	SEK1.7m
Staff:	3,400
No. of plants:	20
Production:	2.1m T
Ownership:	Public (OMK:AAK)+ (NASDAQ:OMX)
Country:	Sweden
Owner:	Melker Schorling 33%, AMF 5%, AlectaPensionsforsakring 5%; others

WHAT DO THEY MAKE?

PRODUCTS

Canola, palm, palm kernel, olive, soybean, sunflower, shea, corn, coconut oils – specialty and semi-specialty oils and fats

BRANDS

Personal care - Lipex, Akogel, Akosun, Akoline, Akofine
Chocolate - Barrier Fat, Deliar, Chocofill, Akopol, Cebes, Silko, Tropicao, Illexao
Nutrition – Vividol, Specidol, Akomed, Akovita, Akonino, Infat
Foodservice – Prep, Whirl, Lion, Uncle John's, Albaol, Rapsodi, Albasauce, Rapsona

OPERATIONS

Leading global provider of shea derived ingredients
20 production facilities; sales offices in 25 countries;
Applications in chocolate, specialty nutrition, baked goods, ice cream, flavour, personal care, animal feed

WHERE ARE THEY?

Europe:	Sweden, Denmark, UK, Germany, Belgium, Poland, Netherlands, Ukraine, Russia, Turkey
Americas:	USA, Canada, Brazil, Mexico, Colombia,
Middle East:	UAE
Asia:	Japan, India, Singapore, China, Philippines
Australasia:	Australia (sales office)
Other:	Burkina Faso, Benin, Ghana, Cote D'Ivoire

DO THEY HAVE ANY MONEY?

RECENT ACQUISITIONS & INVESTMENTS

- 2016 Acquired California Oils Corp
- 2016 Invested in new factories in Brazil and China SEK 400m) to produce special nutrition - Akonino
- 2018 announce investment in customised plant in Philippines

Source: company website; company annual report; various published articles and reports; Coriolis analysis

BUNGE LIMITED

WHO ARE THEY?

CEO/MD:	Soren Schroder
Address:	50 Main Street White Plains, NY 10606 USA
Phone:	914 684 2800
Established:	1818
Website:	www.bunge.com http://europe.bungeloders.com
Revenue:	US$45.7b (2017)
EBIT:	$230m
Staff:	31,000
No. of plants:	51 oil refineries, 24 grain mills, 112 food and ingredients facilities
Production:	165m MT volumes
Ownership:	Public (NYSE:BG)
Country:	USA

WHAT DO THEY MAKE?

PRODUCTS

Oil seeds (soybean, rapeseed, canola, sunflower) – animal feed, cooking oils, margarines and shortening,
Grains – ingredients for cereal, snacks, baked goods, beers, animal feed
Sugar cane – sugar and ethanol

BRANDS

Bunge, Solomix, Soya, Primor, Salada, Delicia, Whole Harvest, Country Premium, Venusz, Floriol, Kujawski, Olek, Unisol, Ideal, Oleina, Maslenitsa, Oliwier, Salat, Rozumnitsa, Smakowita, Maslo Rosline, Masmix, Optima, Deli Reform, Keiju, Evesol, Linco, Gottgott, Suvela, Finuu, Komilli, Deli Reform, Dalda, Ginni, Chambal, Gagan, Masterline, Dou Wei Jia, Suprema, Soberana, Primor, Predileta, Espiga, Esponja, Francesera, Chulita, Galletera, Pastelera.

OPERATIONS

Bunge buys, sells, stores and transports oilseeds and grains; processes oilseeds to make meal for animal feed; produces edible oil products for consumers, food processing, industrial and artisanal bakery, confectionery, human nutrition and food service categories; produces sugar and ethanol from sugarcane; mills wheat, corn and rice to make ingredients used by food companies; and sells fertilizer in South America.

~71m MT grain and oilseed origination; 41m MT soy crush capacity;158 Elevators; 32 port terminals; ~30m MT oilseed and products exports; 52 oil refineries; 24 grain mills.
AU operations: Port terminal, 2 grain receival sites in WA

WHERE ARE THEY?

Europe:	Portugal, Spain, France, Germany, Netherlands, Switzerland, Austria, Poland, Finland, Russia, Ukraine, Romania, Hungry,
Americas:	USA, Canada, Brazil, Argentina,
Middle East:	
Asia:	China, Vietnam, India, Thailand, Indonesia, Singapore, Philippines, Japan,
Australasia:	Australia
Other:	Turkey, Egypt, Kenya, *Operations in 40 countries*

DO THEY HAVE ANY MONEY?

RECENT ACQUISITIONS & INVESTMENTS

- 2015 commissioned two new receivals in WA, AU
- 2017 Acquired Aceitera Martinez (edible oils, capacity of 20,000t/mth)
- 2017 Acquired minority stake in Agricola Alvorada, grain =trader Brazil (increase grain sourcing in region)
- 2018 Acquired two corn flour mills in USA (valued at US$75m)
- 2018 Acquired 70% IOI Loders Croklann (oil solutions, including shea)

- ADM ongoing takeover approaches

Source: company website; company annual report; various published articles and reports; Coriolis analysis

Cocoa Butter Equivalents (CBE's) are produced by a handful of large oil and fat refinery companies globally

MAJOR GLOBAL PRODUCERS OF COCOA BUTTER ALTERNATIVES

2018 or as available

FIRM	HEAD OFFICE OWNERSHIP	GLOBAL SALES	KEY PRODUCTS	KEY REGIONS	WEBSITE NOTES
AAK	Malmo, Sweden Public; OMK:AAK	SEK26.4m (2017) Choc division sales SEK$$7,4m	Canola, palm, palm kernel, olive, soybean, sunflower, shea, corn, coconut oils CBE's = Tropicao, Illexao	Europe Americas	https://aak.com Leading global provider of shea derived ingredients 20 production facilities; sales offices in 25 countries Opened offices in Africa 1990s to control supply chain – 9 offices
BUNGE Loders Croklaan	Wormerveer, The Netherlands Bunge Limited Public; NYSE:BG	US$42.7b (2016; Bunge Limited)	Palm, soybean, canola, sunflower, olive, coconut, shea oils, lecithin	5 continents; 100+ countries served	http://europe.bungeloders.com Leading producer of premium quality seed and tropical oils and fats for food and non food applications Acquired by Bunge in Mar 2018
FUJI OIL	Osaka, Japan Public; TSE:2607	Holding Y3,076b (2017) Oils Y307b	Soybeans, cocoa, palm, shea etc. procurement and production of oils and fats	Japan Europe	https://www.fujioilholdings.com/ Leading producer of oils and fats in Japan; 34 companies in 13 countries Early inventor of industrial mass production of hard butters for chocolate (interesterifaction technology)
ADM	Illinois, USA Public; NYSE: ADM	US$60.8b (2017)	Cereals, grains, oilseeds procurement and processing Specialty CBE range	Global	https://www.adm.com Leading global agribusiness company 500 crop procurement facilities, 270 food and ingredient facilities and 44 innovation centres; JV with Wilmar (Ghana Specialty Fats) to process shea in Ghana (2006) – 25,000t nuts
3F INDUSTRIES LTD.	Hyderabad, India	N/A	Bakery fats, fatty acids, deoiled cakes, glycerine, oils, soaps, animal feed, specialty fats and stearic	India SEA Africa	http://fff.co.in Production facilities in Ghana Launching premium shea butter cosmetics range

Source: various company websites; wide range of published sources; Coriolis analysis

There are also a number of large processors of palm oils and other oils & fats

MAJOR GLOBAL PALM & OTHER OIL/FAT PROCESSORS

2018 or as available

FIRM	HEAD OFFICE OWNERSHIP	GLOBAL SALES	KEY PRODUCTS	KEY REGIONS	WEBSITE NOTES
NISSHIN oillio ISF	THE NISSHIN OILLIO GROUP (Japan) Intercontinental Specialty Fats (Malaysia)	Y338,998m	Nisshin – processed oil and fat, meal, chocolate products, food Palm applications for chocolate, confectionery, bakery fat, dairy fat replacer, frying oils, other; Chocomate CBE's	ISF two factories in Malaysia Japan Europe	http://www.nisshin-oillio.com http://isfsb.com 1987 started production of CBR's Nisshin acquired majority shares in 2004 Range of food, chemical and chocolate companies
IFFCO	Part of Allana Group UAE	N/A	Produces and distributes fats and oils; cultivates, mills and processes palm kernel oil for CBS	USA Malaysia Turkey France	http://www.allana.com http://www.iffco.com foods, ingredients http://www.feldaiffco.com High fractionates based on oil products; 4 processing plants in USA
Olam	Singapore Private/ Public (SGX:O32) Temasek (54%()	SGD$26.3b (2017)	Cocoa, coffee, nuts, tomatoes, spices, food staples (Africa), industrial products (cotton, rubber)		https://www.olamgroup.com/ Vertically integrated firm across 45 main agri-commodity products; specialty fats division producing CBE's
wilmar	Singapore Public; SGX: Wilmar	US$48.3b (2017)	Palm, oilseeds, sugar, soys, etc., Tropical oils division, Specialty fats division, (remove trans fats from palm); biodiesel, fertiliser, flour and rice	Asia Global	http://www.wilmar-international.com Vertically integrated business, palm plantations, cruishesm processors refiners; Produce CBR's and CBE's from palm, shea, etc. JV with ADM Ghana Specialty Oils Plants across Africa and the world
Carson Cumberbatch PLC Premium	Carson Cumberbatch Sri Lanka	SLR 79,894m	Palm oil plantations, and edible oils and fats manufacturing and refining facilities from palm, coconut) in Malaysia; 320,000MT production capacity	Malaysia Indonesia	http://www.carsoncumberbatch.com http://www.goodhopeholdings.com http://www.premiumveg.com Asian based firm with plantations, beverages, real estate, leisure operations; Premium is their oils and fats division

Source: various company websites; wide range of published sources; Coriolis analysis

Who are other potential commercial partners?

FIRM	YEAR EST.	HEAD OFFICE LOCATION OWNERSHIP	GLOBAL SALES # OF EMPLOYEES	KEY PRODUCTS	KEY REGIONS	WEBSITE NOTES
Berg+Schmidt Functional Lipids	1975	Hamburg, Germany Stern-Wywiol Gruppe Family owned	€464m (2016; Stern-Wywiol) 1,300	Shea butter, castor oil derivates, fatty alcohols, fatty acid esters, fatty acids, glycolic acid, etc.	Europe Asia United States	https://www.berg-schmidt.de/en/index.php Functional lipids producer for animal nutrition, oleochemicals, cosmetics industries
GROUPE OLVEA	1929	Saint Leonard, France Daudruy family	€100m 200	Shea butter, argan oil, vegetable oils, fish oils	Europe Africa	https://www.olvea.com/en Specialising in vegetable and fish oils Shea butter produced in accordance with Ethical BioTrade standards; production unit in Burkina Faso for shea butter
L'ORÉAL	1909	Clichy, France Public; OR:PA	€26b (2017) 82,600	Hair colour, skincare, sun protection, cosmetics, perfume, haircare	5 continents; present in 150 countries	https://www.loreal.com/group Largest cosmetics group in the world Shea butter is ingredient in 1,200 Loreal Group products

Source: company website; company annual report; various published articles and reports; Coriolis analysis

GLOSSARY OF TERMS

A$/AUD	Australian dollar
ABS	Absolute change
ANZSIC	AU/NZ Standard Industry Classification
AU	Australia
Australasia	Australia and New Zealand
b	Billion
CAGR	Compound Annual Growth Rate
CIF	Cost plus Insurance and Freight
CN	China
C/S America	Central & South America (Latin America)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CY	Calendar year
E Asia	East Asia
EBITDA	Earnings before interest, tax, depreciation and amortization
FAO	Food and Agriculture Organisation of the United Nations
FOB	Free on Board
FY	Financial year (of firm in question)
GBP	British pounds
HS Code	Harmonized Commodity Description and Coding System
HK	Hong Kong
IQF	Individually quick frozen
JV	Joint venture
m	Million
n/a	Not available/not applicable
NA/ME/CA	North Africa / Middle East / Central Asia
N. America	North America (USA, Canada)
Nec/nes	Not elsewhere classified/not elsewhere specified
N/C	Not calculable
N.H	Northern Hemisphere
R&D	Research and Development
S Asia	South Asia (Indian Subcontinent)
SE Asia	South East Asia
S.H	Southern Hemisphere
SS Africa	Sub-Saharan Africa
T	Tonne
US/USA	United States of America
US$/USD	United States dollar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