A Better World,
Through Better Business

NYU STERN

Center for
Sustainable Business

Deforestation-free Supply Chains: Financial Impact for Brazilian Beef Production

Tensie Whelan, CSB
Bruno Zappa and Nemanja Babic,
A.T. Kearney

August 2017

Stern CSB Project Partners

Methodology and Research Partner: A.T. Kearney

Lead Supply Chain Research Partner:

Funder:
This research funded in part by the Betty and Gordon Moore Foundation

Key Findings

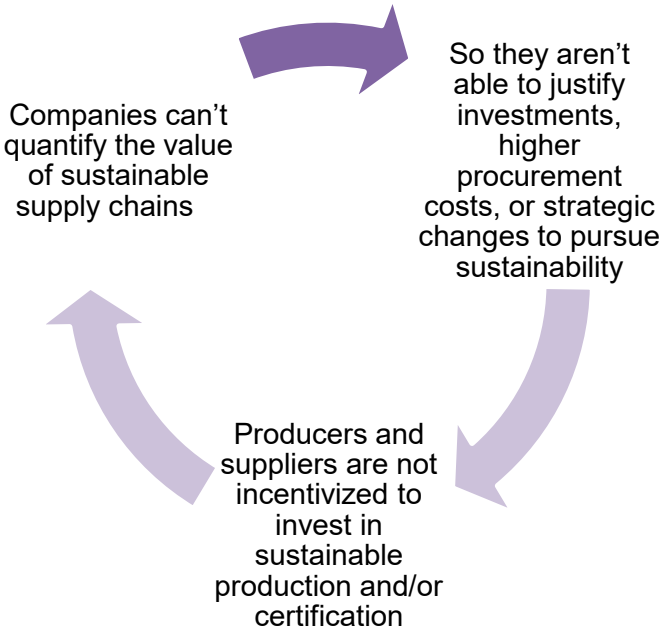
1. It is possible to monetize the financial benefits for the value chain actors, using a methodology that analyzes the drivers of improved performance, identifies key benefits for each supply chain actor, and then monetizes the benefits.
2. Deforestation-free commitments reduce risk and sustainable agriculture practices create financial opportunity throughout the value chain.
3. Sustainable agricultural practices drive innovation by the ranchers, and result in 2.3x improvements in productivity and 6.8x improvements in profitability, primarily due to higher quality beef that commands a premium, and a 20% decrease in GhG emissions.
4. The benefits for slaughterhouses and retailers are smaller in comparison to total business and more difficult to estimate due to the lack of data, yet overall positive.

Companies invest in sustainable supply chains, but face challenges

- Food companies around the world have recognized the need to pursue sustainability in response to pressure from society and to secure the future of their business
- Many of them have committed to sustainable supply chains but face supply limitations
- 450 companies have committed to deforestation-free beef, soy, palm oil, pulp and paper.
- Beef is a significant contributor to deforestation and greenhouse gas emissions.
- In Brazil (the largest beef exporter in the world) cattle are the biggest driver of deforestation in the Amazon and responsible for up to 80% of GHG emissions related to land use change.
- Certified sustainable beef production in Brazil is less than 1%

Limited Sustainable Supply

One of the main reasons for supply scarcity is uncertainty around the benefits of embracing sustainability



- Typical approach to sustainability **fails to assign a monetary** value to benefits
- If companies could **monetize** direct and indirect benefits of sustainable supply chains, than they would be able to build the business case for investing in sustainability, **triggering a positive reaction across the value chain**

Drivers of Financial Performance

The Comprehensive Case for Sustainable Business

When players in a value chain embed sustainability in their core strategy and practices, they consistently drive:

- More Innovation
- Better Risk Management
- Higher Operational Efficiency
- Greater Customer Loyalty
- Improved Supplier Relations
- Better Employee Relations
- Improved Sales and Marketing
- Better Media Coverage

- Lower Cost of Capital
- Greater Profitability
- Higher Corporate Valuation
- Greater Value to Society

Case Study Detail

The selected case studies: FSM and Novo Campo ranches, Mato Grasso State (agricultural frontier)

	Fazendas São Marcelo	Novo Campo
Sustainability history	First ranch to receive Rainforest Alliance certification	Project focuses on intensification as a way to increase productivity & reduce pressure for deforestation
Certifier/Supporter	Imaflora	Instituto Centro de Vida
Commercial Partners	Marfrig, Carrefour	McDonald's, JBS
Focus	Sustainable Ranching Broadly	Intensification (deforestation-free)
Size	28,000 animals per year, 12,000ha of land	12,000 animals per year, 7,700ha of land (10 producers)
Year of Certification	2012	2012 (pilot ran from 2012 – 2014)
Sustainability Reference	Rainforest Alliance SAN Standard	GAP (Embrapa's[1] Good Agricultural Practices)

1. Brazilian Agricultural Research Corporation, a governmental agency for Agriculture and Environment development

Source: A.T. Kearney

Downstream value chain: *Brazil operations only*

Company	Sector	Revenues	Number of Plants/Stores	Number of Employees	Has Committed to Deforestation-free Beef[1]	Sustainability Commitments and Initiatives
	Restaurant	~$1.8B	1,070[2]	54,000+	✓	• Coffee sourcing from Rainforest Alliance Certified Farms • Sustainable fiber-based packaging sourcing
Carrefour	Super-market	~$10B	288	78,000	✓	• 40% reduction in emissions by 2025 • 50% reduction in food waste by 2025 • Increasing local sourcing
JBS	Slaughter-house	$6.3B	42	127,000	✓	• Sustainable water use initiative • Increased sustainable material sourcing
MARFRIG GROUP	Slaughter-house	$2.47B	17	13,800	✓	• Reduction of water consumption • Partnerships with 7 environmental NGOs

1. Slaughterhouses have signed *Condu Adjustment Term* (TAC) with government
2. 870 own stores and 200 franchisees. McDonald's licenses the right to own and operate McDonald's restaurants in Brazil to Arcos Dorados.

Source: Companies' 2015 Financial Statements and Sustainability reports. A.T. Kearney

Methodology – how to use it

The methodology identifies potential benefits and aims to translate their impact into a business case

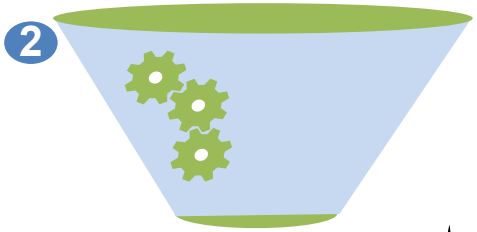
1

	Description
Benefit 1	Cost Savings Through Improved Operational Efficiencies
Benefit 2	Better Positioned to Manage and Mitigate Risk
Benefit 3	Innovation Through Design

List of overarching benefits[1]

- Identification of overarching common benefits from sustainability
  - The tool has a comprehensive list from which to select from

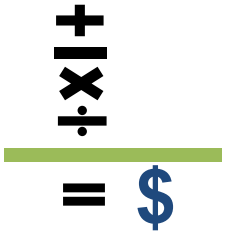
2



Customization and Detailing

- Customize and detail potential specific benefits that apply to the company, under each of the overarching benefits

3



Quantification and Monetization

- Include company's data and assumptions into the tool
- Adjustments may be required according to available data, and or differences of sector/business

1. List of broad sustainability benefits developed by CSB
Source: A.T. Kearney

CSB Methodology Identified 19 Benefits

Benefit Group		Name of Benefit	Applicability to link:		
			Ranch	Slaughterhouse	Retailer
Cost reduction	1.1	Better cost management	✓		
	1.2	Innovation and better agricultural techniques	✓		
	1.3	Higher land productivity (smaller area required)	✓		
Revenue increase	2.1	Price premiums (niche market)	✓	✓	✓
	2.2	Preferred supplier (selling at full price, no discounts)	✓		
	2.3	Increase overall demand for sustainability (mass market)	✓	✓	✓
	2.4	New Revenue Streams available	✓		
Risk Avoidance	3.1	Operational Risk Avoidance	✓	✓	✓
	3.2	Market Risk Avoidance	✓	✓	✓
	3.3	Regulatory Risk Avoidance	✓	✓	✓
	3.4	Reputational Risk Avoidance	✓	✓	✓
Financial & Valuation	4.1	Cost of Capital Reduction		✓	✓
	4.2	Asset appreciation	✓		
Other	5.1	Talent Attraction	✓	✓	✓
	5.2	Talent Retention	✓	✓	✓
	5.3	Improvement in corporate ecosystem (reduced volatility)	✓	✓	✓
	5.4	GhG Emissions Reduction	✓		

Ranches - Findings

Ranches experience drastic improvements in productivity, and gain access to new market opportunities

- It is common for cattle ranches in Brazil to have low productivity resulting from obsolete practices, which creates pressure to expand pastures into fragile biomes
- Sustainable practices, however, offer an alternative to increase productivity while protecting biodiversity and respecting social and environmental issues
- Our data for the ranches was greatly aided by the research work of ICV and Imaflora.

Examples of Practices

- Implementation of better management
- Rural infrastructure improvement:
  - Pasture recuperation
  - Water distribution system
  - Fencing and rotation of fields
- Implementation of conservation areas – especially near water
- Commercial agreements with brands (food and fashion)

Results

- Increase in productivity of up to 2.3x in pounds of beef per area
- Reduced GhG emissions of up to 20%, ton of CO_2 per hectare per year
- Increase in profitability up to 6.8x

Ranches Experience Cost Reductions and Revenue Increases

	Benefit group	Novo Campo		Fazenda São Marcelo	
		Min	*Max*	*Min*	*Max*
Benefits	Cost Reduction	3.9	4.2	33.2	35.8
	Revenue Increase	0.6	1.1	0.9	2.3
	Risk Avoidance	0.5	1.5	2.1	7.6
	Financials[1]	1.1	2.0	0.0	0.0
	Other	0.1	0.9	0.5	3.7
	Total Benefits	**6.3**	**9.7**	**36.8**	**49.4**
Costs and Investments	Infrastructure[2] & Ongoing Costs[3]	**4.9**		**20.2**	
Net Gain	Benefits – Costs	**1.4**	**4.8**	**16.6**	**29.2**
	% of Revenues	8.7%	30.2%	12%	22%

1. Corresponds to 'Asset Appreciation', land value increase by U$1.1 2 Mn
2. FSM investment in Infrastructure was not available. Used Novo Campo's values as proxy
3. Incremental costs due to sustainability were not available, however costs per kg reduced (not increased)

Source: A.T. Kearney

Calculation method

Cost calculations compared financial performance before and after interventions

Benefit Group	Name of Benefit	Ranch	
		Benefit Description	Monetization Method
Cost reduction	Better cost management	Cost reduction as a consequence of more control and better management practices: E.g. lower use of fertilizers and other inputs	Compared major input costs from before and after implementing initiatives, weighted per kg of beef produced, and applied to future expected forecasts, and calculated NPV
	Innovation and better agricultural techniques	Cost reduction as a consequence of innovation and better agricultural techniques, such as Pasture recuperation, water distribution system, fencing and rotation of pasture	Applied cost reduction per kg of beef produced to total production. Cost reduction is calculated by comparing average cost per kg before and after sustainable practices are deployed
	Higher land productivity	Typically, farms would rent out land to supplement own holdings. With higher productivity, farmers can produce at own land, avoiding costs of renting additional land	Calculate total rented area that no longer needs to be rented and multiply by cost of rental (equivalent to area available for rent - for cases where producer did not rent additional land)

Calculation method

Revenue increase benefits derive from higher prices, volumes and additional revenue streams

Benefit Group	Name of Benefit	Ranch	
		Benefit Description	Monetization Method
Revenue increase	Price premiums	Slaughterhouses value sustainability practice in ranches as it increases product quality and contributes to better commercial relations, so ranches can benefit from receiving price premiums for sustainable beef	Multiplied premium paid by slaughterhouse by total expected production (For ranches, we used the actual price premium that they are receiving (for quality, derived from sustainability practices), e.g. Novo Campo gets ~R$0.20 per kg)..
	Selling at full price (no discounts)	A part of sales to slaughterhouses are made at discount, in periods of excess of supply. With sustainability, producers are prioritized and are able to sell at full price. Generating a benefit of higher revenues from selling all production at full price	Estimated what percentage of sales is sold at discount, estimated the discount and calculated total sales loss
	Increase in demand for sustainability	Consumer trends indicated that in the medium and long term, demand for sustainable products will rise, creating a potential benefit of increase in future sales volumes	Applied estimated increase in future sales to forecasted sales volumes
	New Revenue Streams available	New revenue streams: With greater productivity, ranches are able to dedicate former (or rotating) pastures to new uses (e.g. planting soy or corn)	Estimated % of area that can be reallocated to other activities (e.g. planting soy), estimated revenue from new activity per ha

Calculation method

Risk avoidance is based on the probability and magnitude of potential business risk

Benefit Group	Name of Benefit	Ranch	
		Benefit Description	Monetization Method
Risk Avoidance	Operational Risk Avoidance	Operational Risk: Revenue loss avoidance derived from operational complications that reduce production and sales. E.g.: Pasture exhaustion, water shortage, cattle diseases	Estimated probability of risk really occurring, estimated the impact in sales and calculated lost revenues
	Market Risk Avoidance	Market Risk: Revenue loss avoidance derived from changes in market demand, which in the future is expected to favor producers that are sustainable	Estimated probability of decrease in market demand for unsustainable beef occurring, and estimated the impact in sales
	Regulatory Risk Avoidance	Regulatory Risk: Avoiding revenue loss derived from future changes in regulation that disqualify ranch to produce and sell beef	Estimated probability of regulatory changes occurring, and estimated the impact in sales
	Reputational Risk Avoidance	Reputational Risk: Avoiding revenue loss derived from reputational damage (e.g. activist campaign, sustainability scandals)	Estimated probability of reputational damage occurring, and estimated the impact in sales

Calculation method

Other benefits include lower cost of capital, incremental revenues from talent, reduced training cost and GhG emissions

Benefit Group	Name of Benefit	Ranch	
		Benefit Description	Monetization Method
Financial and Valuation	Asset Appreciation	Increase in land value due to investments in sustainability infrastructure (CAPEX)	Add "sustainability increment" to current land value, estimate time to implement infrastructure improvements, calculate NPV
Other	Talent Attraction	Talent attraction: higher revenues per employee due to best talents	Estimate incremental revenue that top performing employees generate, and potential to attract top performing employees
	Talent Retention	Turnover costs avoidance derived from employees working longer due to sustainability practices	Estimate turnover reduction and costs associated with turnover (new employee training, operations only), weighted by probability: Hours of training required and cost per hour
	GhG Emissions Reduction	Environmental: GhG Emission avoidance generated by use additives to feed and other techniques	Estimate GhG reductions per ha, multiply for entire area and apply a cost per ton of GhG (estimated Carbon Tax based on Mexico's benchmark - assuming tax taking place in year 7)

Ranchers – Testimonials

While ranchers weren't always able to quantify the impact, anecdotal evidence supports the positive benefits

Pasture under rotation system, FSM

Confinement area, FSM

Ranch Manager, Leone Furlanetto, next to improved feed & infrastructure, FSM

Novo Campo producer, Francisco Militão, on river side vegetation recuperation

"There is no price premium for sustainability alone, only for quality. ***But when we implemented sustainable practices, our quality immediately increased. Now 70% of beef is sold with quality premium,*** *up from 0% in 2 years"* - Novo Campo producer

"We might take loans in the future now that ***we know it pays back"*** – Novo Campo producer

"I ***used to pay R$7,000/month*** *to my neighbor to use his land"* - Novo Campo producer

*"****All initiatives*** *(e.g.: pasture recuperation, animal monitoring, water distribution),* ***must be carried together, in order to obtain gains in productivity****. And we can't say how much of productivity gains derive from each initiative" – ICV*

Source: A.T. Kearney

Slaughterhouses - Summary

Slaughterhouses were pressured into improving sustainability, but now see it as improving quality

- When Greenpeace identified the cattle sector in the Brazilian Amazon as the largest driver of deforestation in the world in 2009's "Slaughtering the Amazon" report, it created a turning point.
- Since then all major slaughterhouses have committed to deforestation-free beef.
- More recent results showed that sustainable practices are an effective way to increase quality

Examples of Practices

- Monitoring of suppliers with satellite imaging tools
- Selection of suppliers upon consultation of public lists that control for Environmental, Labor and Indigenous issues

Results

- Increased overall offer of high quality beef, resulting in larger supplier base and higher potential margins
- Guarantee of 'first level deforestation-free'
  - Full traceability is not yet possible
- Gradual reversion of reputational damage
  - New articles and reports have praised sustainability performance
- Identified potential economic net benefits of U$19 – 119Mn with extrapolation[1]

Slaughterhouses Improve Revenues, Reduce Risk

US$ Mn, NPV	Benefit group	Marfrig		JBS	
		Min	*Max*	*Min*	*Max*
Benefits	**Cost Reduction**	0.0	0.0	0.0	0.0
	Revenue Increase	5.8	19.3	21.8	72.6
	Risk Avoidance	1.8	8.6	21.3	72.9
	Financials[1]	0.1	0.4	1.3	3.9
	Other	0.5	2.1	3.2	11.8
	Total Benefits	**8.3**	**30.4**	**47.6**	**161.2**
Costs and Investments	**Infrastructure & Ongoing Costs[2]**	**7.0**	**13.9**	**29.9**	**58.1**
Net Gain	**Benefits – Costs**	**1.3**	**16.5**	**17.8**	**103.1**
	% of Revenues	0.01%	0.13%	0.02%	0.09%

1. Includes gains from increase in Market Cap (U$92-277k and U$780 -2,342k)
2. Cost information was not shared, internal estimates (tools subscription + increase in costs of beef by 0.5-1%)

Source: A.T. Kearney

Calculation method

Revenue increase derives from higher prices in niche markets, and projected increased demand for sustainable products

Benefit Group	Name of Benefit	Slaughterhouse	
		Benefit Description	Monetization Method
Revenue increase	Price premiums	Price premiums (niche): as seen in other regions, niche markets where consumers pay premiums for sustainability in goods and services, are rising in Brazil, creating the potential increase in revenues for Slaughterhouses that are equipped to meet that demand	Multiplied expected premium paid by niche markets for sustainable beef by expected future share of total beef sales, weighted for probability (estimated 10-20% premiums for niche markets)
	Increase in demand for sustainability	Increase in demand (mass): Consumer trends indicated that in the medium and long term, demand for sustainable products will rise, creating a potential benefit of overall increase in future sales volumes of products that are sustainable	Estimated increase in future sales of sustainable beef, multiplied by forecasted volumes of sustainable beef sold, calculated NPV, weighted by probability

Calculation method

Risk avoidance is based on the probability and magnitude of potential business risk

Benefit Group	Name of Benefit	Slaughterhouse	
		Benefit Description	Monetization Method
Risk Avoidance	Operational Risk Avoidance	Operational risk avoidance: By purchasing sustainable beef, slaughterhouses can protect their businesses from risk of reduced access to raw material, caused by operational issues in the supply chain (e.g.: country wide supply limitations, such as pasture exhaustion, water shortage and cattle diseases). Creating a benefit of potential future revenue loss avoidance	Estimated probability of risk occurring, estimated the impact in sales and calculated potential revenue loss
	Market Risk Avoidance	Market Risk: It is expected that some consumers and retailers opt not to buy from unsustainable sources. By commercializing sustainable beef, slaughterhouses avoid loss of market share and future revenues	Estimated probability of market demand for unsustainable beef decreasing, estimated potential impact on revenues
	Regulatory Risk Avoidance	Regulatory Risk: Slaughterhouses purchase beef from thousands of different suppliers, which makes it challenging to ascertain that all suppliers comply with regulation, but it is still their responsibility to purchase only beef that was produced in compliance with regulation. By commercializing sustainable beef, slaughterhouses avoid risks of being fined	Estimated value of fine, probability of being fined in the medium and long term for buying potentially non-sustainable beef (e.g. non-certified, or beef with uncertain origin)
	Reputational Risk Avoidance	Reputational Risk: Increasing transparency and societal pressure on corporations puts their reputation at risk if they do not perform well on sustainability. Damages to reputation can lead to sales loss. By commercializing sustainable beef, these companies reduce reputational risk and associated drop in sales.	Estimated probability of reputational damage occurring, and estimated the impact in sales

Calculation method

Other benefits include lower cost of capital, incremental revenues from talent, reduced training cost and GhG emissions

Benefit Group	Name of Benefit	Slaughterhouse	
		Benefit Description	Monetization Method
Financial and Valuation	Cost of Capital Reduction	Reduced Cost of Capital: Companies with high sustainability standards have access lower cost capital. i) Governmental funds and public lines of credit; ii) Private banks tend to concede better financing conditions for companies with positive ESG stances, as it is believed that sustainability correlates with better management, among other reasons	Estimated reduction in cost of debt and multiplied by forecasted annual debt expense, weighted by probability of happening. Applied expected ramp-up period for benefit to take effect
Other	Talent Attraction	Talent attraction: Companies that have strong ESG stances are more able to attract better talents in industry, those top talents are able to generate higher revenues (per employee)	Estimate incremental revenue that top performers employees generate, and potential to attract top performing employees (management positions only), weighted by probability. Applied expected ramp-up period for benefit to take effect
	Talent Retention	Turnover costs: sustainability is a factor that contributes on employee retention. Avoiding turnover is a effective way to reduce costs, for slaughterhouses it is specially relevant in new (operations) employee training costs	Estimate turnover reduction and costs associated with turnover (new employee training, operations only), weighted by probability: Hours of training required and cost per hour
	Corporate ecossystem: reduced volatility	Corporate Ecosystem: slaughterhouses buy beef from a large number of suppliers, but some concentrate a significant part of all (10% represent ~30%), commercial volatility with those main suppliers may result in higher procurement costs	Estimated economy of scale (as a percentage of beef purchases) applied to forecasted purchases, weighed by probability

Slaughterhouses – Testimonials

While public pressure was the initial impetus for sustainability, better quality ensures the processors' commitment

*"Everything changed in 2009, with the report the spotlight was on the beef industry, and so **we had to change how we did business**"* Leonel Almeida, Sustainability Director - Marfrig

*"Our suppliers that are committed to sustainable practices have **better quality products**"* Leonel Almeida, Sustainability Director - Marfrig

*"**We prioritize sustainable beef producers over conventional**, it's better for the environment and for business"* Leonel Almeida, Sustainability Director - Marfrig

"It is in fact incredibly hard to know how much consumers value sustainability" Marcio Nappo, Sustainability Director - JBS

*"We supported Novo Campo project ensuring demand, **transmitting credibility to the project and connecting with other special buyers** – McD only buys 30% of the carcass"* Marcio Nappo, Sustainability Director - JBS

Retail – Key Findings

Retailers invest in sustainability to protect their reputation, and as a way to engage consumers

- Consumer-facing companies such as McDonalds and Carrefour have a direct opportunity to ‘sell’ sustainability as a product differentiator, and pressure to maintain their reputation
- Retailers also benefit from forging healthy relationships in the supply chain (ensuring supply quality and continuity), and may benefit from talent retention and lower cost of capital

Examples of Practices

- Monitoring of suppliers with satellite imaging tools
- Selection of suppliers upon consultation of public lists that control for Environmental, Labor and Indigenous issues
- Expose sustainable products and communicate attributes (e.g. certification logos)

Results

- Guarantee of ‘first level deforestation-free’
  - Full traceability is not yet possible
- Identified potential benefits of U$13-62Mn with extrapolation[1]
- Additional (differentiated and premium) product offering

1. Extrapolation refers to the scenario that assumes that 15% of purchased beef is sustainable, which is a tipping point where the business case becomes more relevant and attractive

Source: A.T. Kearney

Retailers Improve Revenues, Reduce Risk

US$ Mn, NPV	Benefit group	Carrefour		McDonald's	
		Min	*Max*	*Min*	*Max*
Benefits	**Cost Reduction**	0.0	0.0	0.0	0.0
	Revenue Increase	5.7	17.0	3.4	10.2
	Risk Avoidance	6.4	27.2	2.5	10.6
	Financials[1]	0.3	1.0	0.3	1.0
	Other	1.3	7.0	0.4	2.2
	Total Benefits	**13.6**	**52.2**	**6.6**	**24.0**
Costs and Investments	**Infrastructure & Ongoing Costs[2]**	**6.7**	**12.2**	**0.9**	**1.7**
Net Gain	**Benefits – Costs**	**6.8**	**39.9**	**5.7**	**22.2**
	% of Revenues	0.01%	0.07%	0.18%	0.68%

1. Includes gains from increase in Market Cap (U$92-277k and U$780 -2,342k)
2. Cost information was not shared, internal estimates (tools subscription + increase in costs of beef by 0.5-1%)

Source: A.T. Kearney

Calculation method

Revenue increase derives from higher prices in niche markets, and projected increased demand for sustainable products

Benefit Group	Name of Benefit	Slaughterhouse	
		Benefit Description	Monetization Method
Revenue increase	Price premiums	Price premiums (niche): as seen in other regions, niche markets where consumers pay premiums for sustainability in goods and services, are rising in Brazil, creating the potential increase in revenues for food retailers that are equipped to meet that demand	Multiplied expected premium paid by niche markets for sustainable beef by expected future share of total beef sales, weighted for probability (estimated 10-20% premiums for niche markets for Carrefour. McDonalds said they would not charge a premium)
	Increase in demand for sustainability	Increase in demand (mass): Consumer trends indicated that in the medium and long term, demand for sustainable products will rise, creating a potential benefit of overall increase in future sales volumes of products that are sustainable	Estimated increase in future sales of sustainable beef, multiplied by forecasted volumes of sustainable beef sold, calculated NPV, weighted by probability

Calculation method

Risk avoidance is based on the probability and magnitude of potential business risk

Benefit Group	Name of Benefit	Slaughterhouse	
		Benefit Description	Monetization Method
Risk Avoidance	Operational Risk Avoidance	Operational risk avoidance: By purchasing sustainable beef, retailers can protect their businesses from risk of reduced access to raw material, caused by operational issues in the supply chain (e.g.: country wide supply limitations, such as pasture exhaustion, water shortage and cattle diseases). Creating a benefit of potential future revenue loss avoidance	Estimated probability of risk occurring, estimated the impact in sales and calculated potential revenues loss
	Market Risk Avoidance	Market Risk: It is expected that some consumers and retailers will opt to not buy from unsustainable sources. By commercializing sustainable beef, retailers avoid loss of market share and future revenues	Estimated probability of market demand for unsustainable beef decreasing, estimated potential impact on revenues
	Regulatory Risk Avoidance	Regulatory Risk: Food retailers purchase beef from many suppliers, which makes it challenging to ascertain that all suppliers comply with regulation, but it is still their responsibility to purchase only beef that was produced in compliance with regulation. By commercializing sustainable beef, food retailers avoid risks of being fined.	Estimated probability of being fined in the medium and long term for buying potentially non-sustainable beef (e.g. non-certified, or beef with uncertain origin)
	Reputational Risk Avoidance	Reputational Risk: Increasing transparency and societal pressure on corporations puts their reputation at risk if they do not perform well on sustainability. Damages to reputation can lead to sales loss. By commercializing sustainable beef, these companies reduce reputational risk and associated drop in sales.	Estimated probability of reputational damage occurring, and estimated the impact in sales

Calculation method

Other benefits include lower cost of capital, incremental revenues from talent, reduced training cost and GhG emissions

Benefit Group	Name of Benefit	Slaughterhouse	
		Benefit Description	Monetization Method
Financial and Valuation	Cost of Capital Reduction	Reduced Cost of Capital: Companies with high sustainability standards can access lower cost capital. i) Governmental funds and public lines of credit; ii) Private banks tend to concede better financing conditions for companies with positive ESG stances, as it is believed that sustainability correlates with better management.	Estimated reduction in cost of debt and multiplied by forecasted annual debt expense, weighted by probability of happening. Applied expected ramp-up period for benefit to take effect
Other	Talent Attraction	Talent attraction: Companies that have strong ESG stances are better able to attract top talent, who in turn are able to generate higher revenues (per employee)	Estimate incremental revenue that top performers employees generate, and potential to attract top performing employees (management positions only), weighted by probability. Applied expected ramp-up period for benefit to take effect
	Talent Retention	Turnover costs: sustainability is a factor that contributes to employee retention. Avoiding turnover is a effective way to reduce costs, for retailers it is specially relevant in new (operations) employee training costs	Estimate turnover reduction and costs associated with turnover (new employee training, operations only), weighted by probability: Hours of training required and cost per hour
	Corporate ecossystem: reduced volatility	Corporate Ecosystem: food retailers buy beef from key slaughterhouses; commercial volatility with those main suppliers may result in higher procurement costs	Estimated economy of scale (as a percentage of beef purchases) applied to forecasted purchases, weighed by probability

Retailers – Testimonials

Retailer sustainability commitments are shaped by consumer demand, as well as reputational and supply chain risk

Rainforest Alliance certified beef sold under Carrefour's private label *"Garantia de Origem"*. RA logo shown on beef São Paulo – SP

Rainforest Alliance logo on beef, at *Emporium Gourmet*, Barretos – SP

: "Supporting sustainable development initiatives is one of the Arcos Dorados priorities and The Novo Campo Project is totally aligned with this, showing excellent results in sustainable beef production. " Leonardo Lima Sustainability Directoor, Arcos Dorados (McDonald´s)

*"In 2009, after Greenpeace's report on beef and amazon deforestation, **we had to reduce our supply base to as few as six different suppliers**. Which is not a ideal position to be in in terms of price and volume negotiations" Paulo Pianez, Sustainability Director - Carrefour*

Certified beef sold as 'premium beef' in specialized beef store, under private label created by certified producer, at *Emporium Gourmet*, Barretos – SP

*"**Beef** is one of the six supply chains that Carrefour considers critical, and where we must dedicate efforts to avoid impact" Paulo Pianez, Sustainability Director - Carrefour*

"**Sustainable and organic food is a big bet of the company**. We are opening a flagship store in São Paulo in which these two attributes will play a central role in visual communication and general messaging to clients" *Paulo Pianez, Sustainability Director - Carrefour*

CSB General Research Recommendations

- Deforestation-free supply chains appear impractical financially without the financial benefits conferred by improved sustainable agricultural techniques. Future research should examine our thesis that investments in deforestation-free supply chains should be accompanied by investments in sustainable agriculture.
- At the ranch level, more research is needed into the business case for sustainable agriculture innovations-- in terms of different standards, types of ranchers, and current levels of sustainable practices. For example, do different sustainable agriculture standards confer different types of financial benefits? Does the size of the ranch effect the ROI in any way? Does the entry level performance effect the financial benefits?
- Also at the ranch level, a full cost accounting, looking at the average cost of training and technical assistance for adoption of sustainable agriculture practices across different standards, in addition to capital or management costs, would be critical to understand investment needs.
- At the slaughterhouse and retailer level, more research is needed into monetizing the financial benefits of risk reduction and also of more stable and higher quality supply. Ideally, slaughterhouses and retailers would build risk monetization metrics into their accounting framework, as well as the revenues associated with better employee relations and higher quality, more sustainable suppliers.

Corruption in the Beef Sector in Brazil

Additional Observations

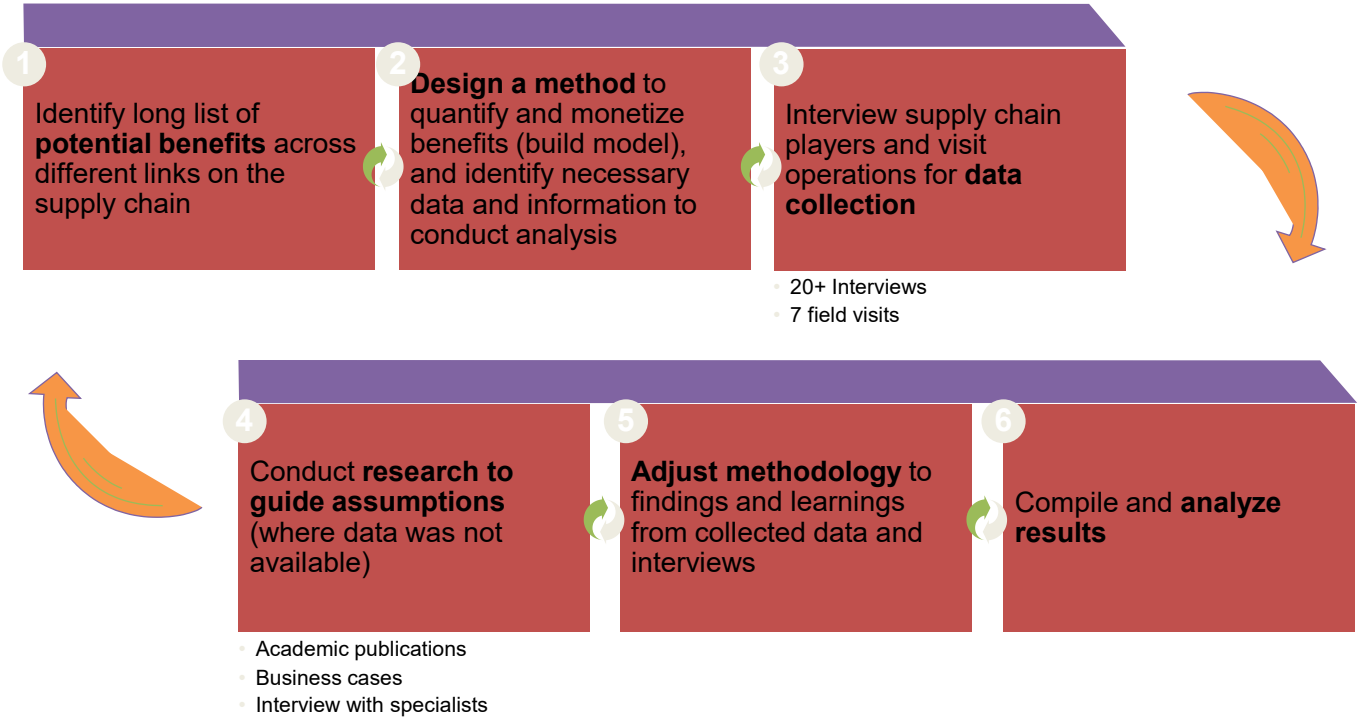
- Just as we finished this research, Brazilian media reported that the authorities in Brazil suspended 33 government officials amid allegations that some of the country's biggest meat processors have been selling rotten beef and poultry for years. Three meat processing plants have also been closed and another 21 meat packers have been suspended. Several countries have banned Brazilian meat imports.
- Just a few days later, as part of a three-year operation code-named “Cold Meat,” Brazil’s environmental protection agency, Ibama, raided two JBS meatpackers in the state of Pará that are accused of having purchased thousands of heads of cattle raised on illegally deforested land in the Amazon.
- The negative financial implications of this unsustainable behavior for JBS and the industry are substantial, ranging from potential prison sentences to government fines, to reduced sales and pricing.
- Clearly, the slaughterhouses have not been monetizing the risk reduction benefits of sourcing sustainably, as they have done for premium products in our case study.

Methodology: Five Steps

- **First, based on our framework --*Sustainable Business Benefits at the Firm Level* – we identified a list of potential benefits of adopting sustainable and deforestation-free practices across the different players in the supply chain.**
- **Second, we designed a method to quantify those benefits and ascribe a monetary value to them. We analyzed the key drivers of improved performance through adoption of sustainable practices; identified significant benefits for each supply chain actor based each of the overarching drivers; quantified the results and assigned a dollar value.**
- **Third, we conducted a round of interviews with industry stakeholders and made site visits to key project partners.**
- **Fourth, we conducted further desktop research (consulting academic papers, business publications and industry reports, and primary sources ,e.g., public/commerce statistics) and finalized our key assumptions.**
- **Fifth, we input the data and assumptions, assigned a final monetary value to the benefits, and compiled the results for the case study.**

The methodology rquires an iterative process reflecting inputs from multiple stakeholders

Methodology – how it was built



Source: A.T. Kearney

We identified a list of 21 benefits, which were later grouped under five categories

Methodology Overview – Approach

Non Exhaustive

	Hypothesis
Cost Reduction	Better **cost management**
	Enhanced **techniques** and **innovation**
	(…)
Revenue increase	Price **premium**
	Expected **higher demand**
	(…)
Risk Avoidance	**Operational** risk
	Regulatory risk
	(…)
Financial	Reduced **cost of debt**
	Land appreciation
	(…)
Other	**Talent** retention
	GhG emissions reduction
	(…)

Description

- Cost reduction as a consequence of more control and better management practices: E.g. lower use of fertilizers, seeds and other inputs

Monetization method

- Compared input costs before and after implementing initiatives, weighted per kg of beef produced, and applied to future expected forecasts, and calculated NPV

Source: A.T. Kearney

Field visits assured that methodology was viable, data was collected and that local intelligence was captured

Methodology Overview – Field visit and Data collection

Source: A.T. Kearney

Imaflora office, Piracicaba – SP

FSM – Pasture, Tangará da Serra - MT

Francisco Militão, Novo Campo Producer, Alta Floresta - MT

JBS plant, Alta Floresta - MT

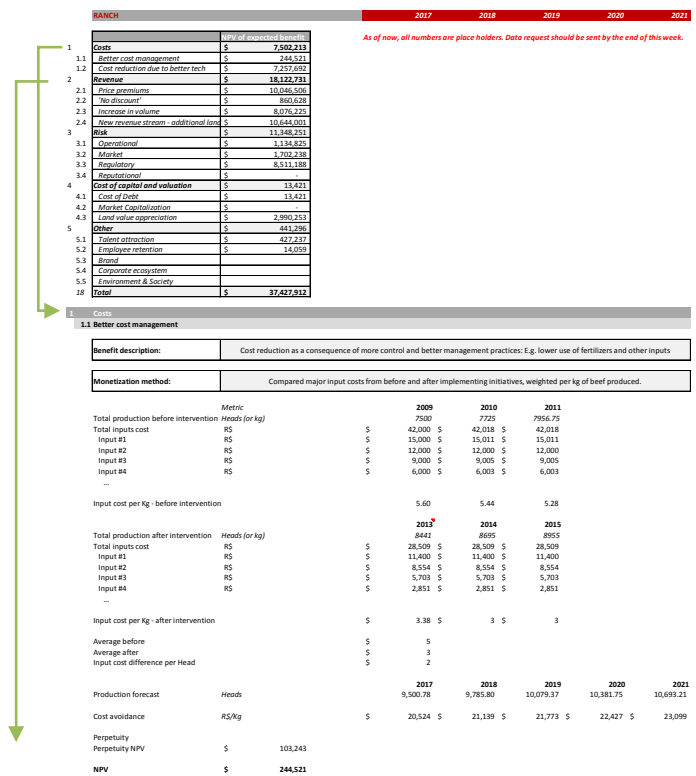
Inputs and assumptions

Key inputs to calculations

Inputs			
Name	**Metric**	**Value**	**Source**
Discount Rate (Ranches, Slaughterhouses and Retailers)	%	15%, 14% and 13%	TNC and A.T. Kearney estimate
Inflation	%	4.50%	Central Bank of Brazil, 2017 target
Exchange Rate 2015	USD / BRL	$3.94	XE
Exchange Rate 2017	USD / BRL	$3.13	XE
Total Heads – FSM	units	28102	FSM, Tangará and Juruena
Total Heads – Novo Campo	units	12397	ICV interview (calculated)
Premium for sust. – FSM	R$/kg	$ 0.03	FSM Interview
Premium for sust. – Novo Campo	R$/kg	$ 0.23	ICV Interview
Weight per head - FSM	kg	283.5	FSM presentation pdf - 2016
Weight per head - Novo Campo	kg	300	ICV interview
Infrastructure Investment	*R$/ha*	2,000.00	ICV interview
Total Area – FSM	ha	31,623	FSM Presentation
Total Area – Novo Campo	ha	7,700	ICV interview
Cost of land (rental)	R$/ha	$ 116.67	ICV interview
Land Value - Novo Campo - before sust.	R$/ha	$ 25,000.00	Novo Campo Producer Interview
Land Value - Novo Campo - after sust.	R$/ha	$ 30,000.00	Novo Campo Interview
Cost Without sustainability	R$/kg	$ 3.20	ICV - Novo Campo Pilot
Cost With sustainability	R$/kg	$ 2.20	ICV - Novo Campo - Pilot
Fines – Environmental	% rev.	1%	A.T. Kearney estimate
Decrease in cost of debt	p.p.	0.01- 0.02%	A.T. Kearney estimate
Future niche market – size	% of total	2.5 - 5%	A.T. Kearney estimate
Premiums paid in niche market	%	10 -20%	Reference FSM/Carrefour beef is 30% premium to normal beef
Top talent incremental revenue	%	1-10%	A.T. Kearney estimate
Employee per trainer	units	100	A.T. Kearney estimate
Long term increase in beef cost due to sustainability	%	0.5 – 1%	A.T. Kearney estimate
Agrotools annual cost (monitoring suppliers)	% of rev.	0.0002%	JBS interview (approx. R$1 Mn)

Once the benefit was defined, a monetization method was designed for each benefit

Illustrative



RANCH

			2017	2018	2019	2020	2021
		NPV of expected benefits					
1	**Costs**	$ 7,502,213					
1.1	*Better cost management*	$ 244,521					
1.2	*Cost reduction due to better tech*	$ 7,257,692					
2	**Revenue**	$ 18,122,731					
2.1	*Price premiums*	$ 10,046,506					
2.2	*'No discount'*	$ 860,628					
2.3	*Increase in volume*	$ 8,076,225					
2.4	*New revenue stream - additional land*	$ 10,644,001					
3	**Risk**	$ 11,348,251					
3.1	*Operational*	$ 1,134,825					
3.2	*Market*	$ 1,702,238					
3.3	*Regulatory*	$ 8,511,188					
3.4	*Reputational*	$ -					
4	**Cost of capital and valuation**	$ 13,421					
4.1	*Cost of Debt*	$ 13,421					
4.2	*Market Capitalization*	$ -					
4.3	*Land value appreciation*	$ 2,990,253					
5	**Other**	$ 441,296					
5.1	*Talent attraction*	$ 427,237					
5.2	*Employee retention*	$ 14,059					
5.3	*Brand*						
5.4	*Corporate ecosystem*						
5.5	*Environment & Society*						
18	**Total**	$ 37,427,912					

As of now, all numbers are place holders. Data request should be sent by the end of this week.

1 Costs

1.1 Better cost management

Benefit description:	Cost reduction as a consequence of more control and better management practices: E.g. lower use of fertilizers and other inputs
Monetization method:	Compared major input costs from before and after implementing initiatives, weighted per kg of beef produced.

	Metric		2009	2010	2011
Total production before intervention	*Heads (or kg)*		*7500*	*7725*	*7956.75*
Total inputs cost	R$	$	42,000	$ 42,018	$ 42,018
Input #1	R$	$	15,000	$ 15,011	$ 15,011
Input #2	R$	$	12,000	$ 12,000	$ 12,000
Input #3	R$	$	9,000	$ 9,005	$ 9,005
Input #4	R$	$	6,000	$ 6,003	$ 6,003
...					
Input cost per Kg - before intervention			5.60	5.44	5.28

			2013	2014	2015
Total production after intervention	*Heads (or kg)*		*8441*	*8695*	*8955*
Total inputs cost	R$	$	28,509	$ 28,509	$ 28,509
Input #1	R$	$	11,400	$ 11,400	$ 11,400
Input #2	R$	$	8,554	$ 8,554	$ 8,554
Input #3	R$	$	5,703	$ 5,703	$ 5,703
Input #4	R$	$	2,851	$ 2,851	$ 2,851
...					
Input cost per Kg - after intervention		$	3.38	$ 3	$ 3
Average before		$	5		
Average after		$	3		
Input cost difference per Head		$	2		

		2017	2018	2019	2020	2021
Production forecast	*Heads*	9,500.78	9,785.80	10,079.37	10,381.75	10,693.21
Cost avoidance	*R$/Kg*	$ 20,524	$ 21,139	$ 21,773	$ 22,427	$ 23,099

Perpetuity		
Perpetuity NPV	$	103,243
NPV	**$**	**244,521**

Consolidation

- Sum of benefits to each link of the supply chain
- Grouped by benefit type
- Will contemplate a conservative and an aggressive scenario

Quantification & Monetization

- Each specific benefit is quantified and monetized in a particular manner
- 10 years horizon (with our without perpetuity)
- Combination of actual data and guided assumptions
  - *Currently values shown in the model are place-holders*

Source: A.T. Kearney

Cost mgmt. benefit is calculated by comparing input costs before and after initiatives, and applying savings to forecasts

Illustrative

Monetization Example I

1 Costs

1.1 Cost Management

Benefit description:	Cost reduction as a consequence of higher control and better management practices: E.g. lower use of fertilizers and other inputs
Monetization method:	Compared major input costs from before and after implementing initiatives, weighted per kg of beef produced.

	Metric		**2009**	**2010**	**2011**		**2013**	**2014**	**2015**
Total production before intervention	*Heads (or kg)*		*7500*	*7725*	*7956.75*		*8441*	*8695*	*8955*
Total inputs cost	R$	$	42,000	$ 42,018	$ 42,018	$	28,509	$ 28,509	$ 28,509
Input #1	R$	$	15,000	$ 15,011	$ 15,011	$	11,400	$ 11,400	$ 11,400
						$		$	$
Input #2	R$	$	12,000	$ 12,000	$ 12,000		8,554	8,554	8,554
		$		$	$		$	$	$
Input #3	R$		9,000	9,005	9,005		5,703	5,703	5,703
		$		$	$		$	$	$
Input #4	R$		6,000	6,003	6,003		2,851	2,851	2,851
…									
Input cost per Kg		*Before*	5.60	5.44	5.28	*After*	3.38	3.28	3.18
		$		$	$				
Input cost per Kg - after intervention			3.38	3	3				
		$							
Average before			5						
		$							
Average after			3						
		$							
Input cost difference per Head			2						

		2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Production forecast	*Heads*	9,500.78	9,785.80	10,079.37	10,381.75	10,693.21	11,014.00	11,344.42	11,684.76	12,035.30	12,396.36
Cost avoidance	*R$/Kg*	$ 20,524	$ 21,139	$ 21,773	$ 22,427	$ 23,099	$ 23,792	$ 24,506	$ 25,241	$ 25,999	$ 26,779
Perpetuity										$	267,785

Perpetuity NPV	$	103,243
NPV	**$**	**244,521**

Source: A.T. Kearney