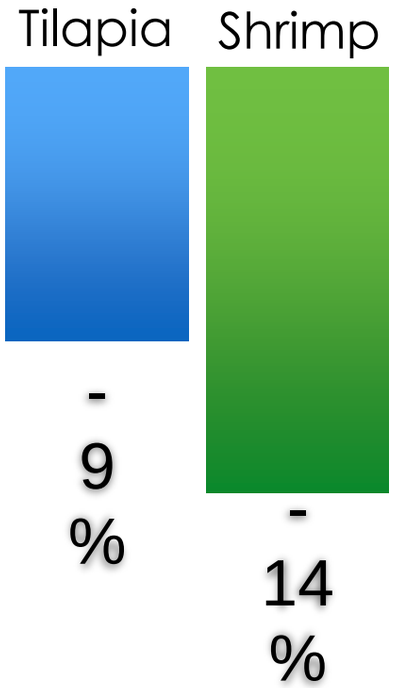
Perspectives on Shrimp Industry

January 2016
Chilaw, Sri Lanka

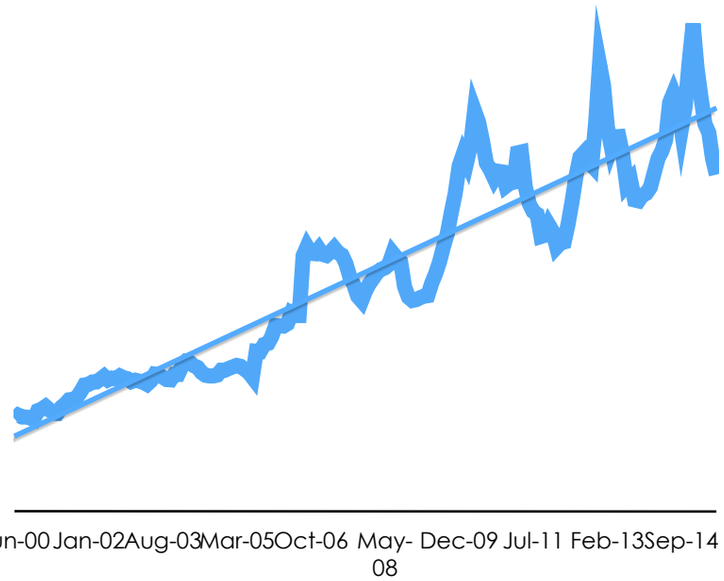
Market Conditions Today

Lower Prices



Higher Costs

Fishmeal (Peru)

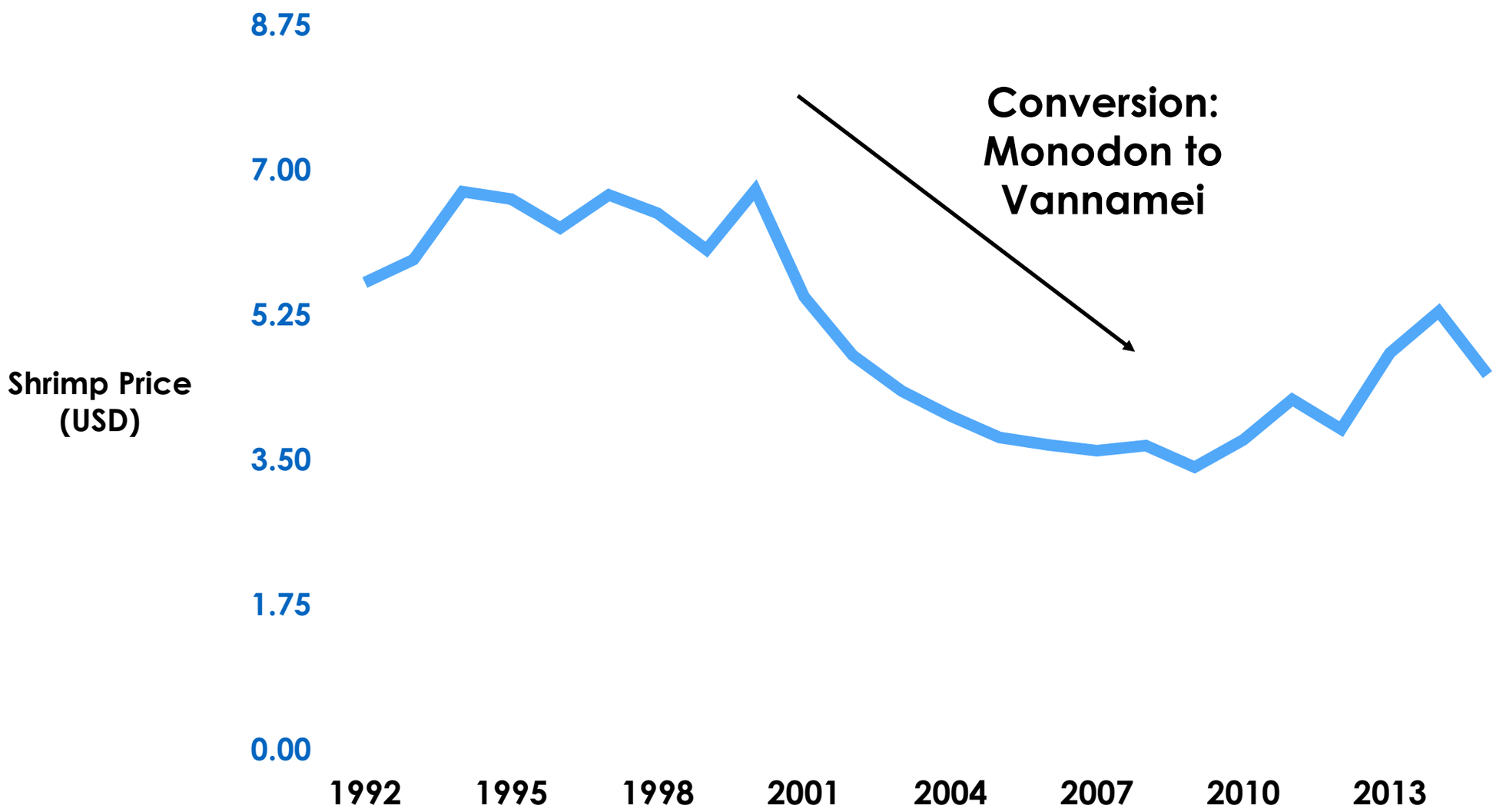


Disease

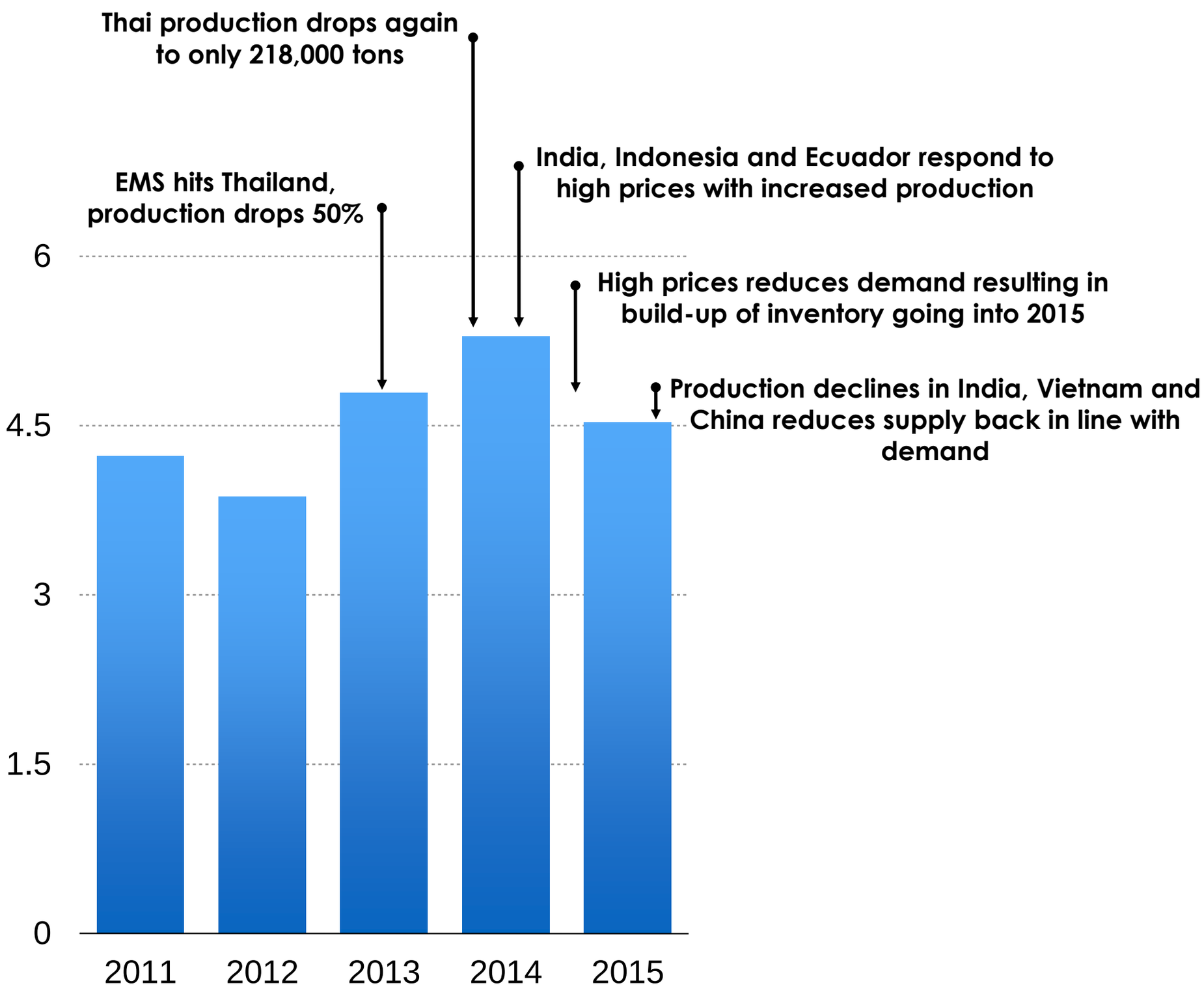
160 tonnes of dead fish found in farms along Johor Straits

Source: USDA, Index Mundi, JFD Analysis

Shrimp prices - the long view



Prices struggling to find a supply demand balance



Monodon prices - why lower than vannamei?

Some views:

- Not true in all markets, e.g. Thailand where farmers switched from vannamei to monodon to get higher price

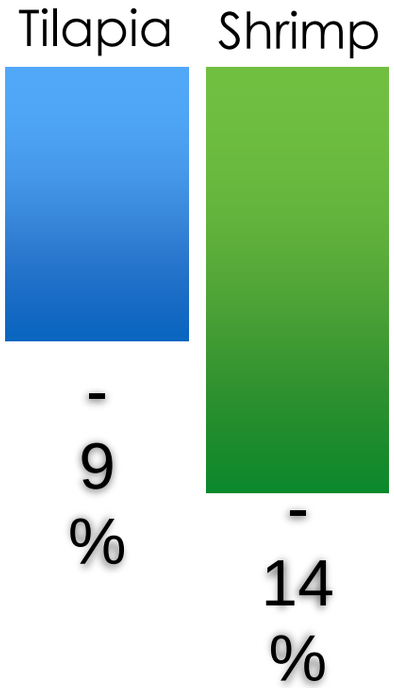
- Indian processors have supply commitments for vannamei which they struggle to fill due to vannamei production declines - temporary blip in vannamei prices?

- Consumers trading down from monodon to vannamei?

- Monodon no longer marketed as much as before?

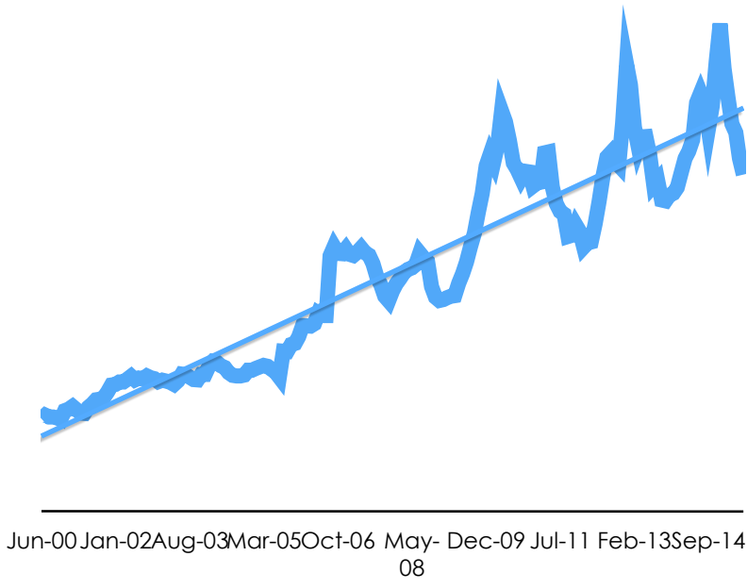
Market Conditions Today

Lower Prices



Higher Costs

Fishmeal (Peru)



Disease

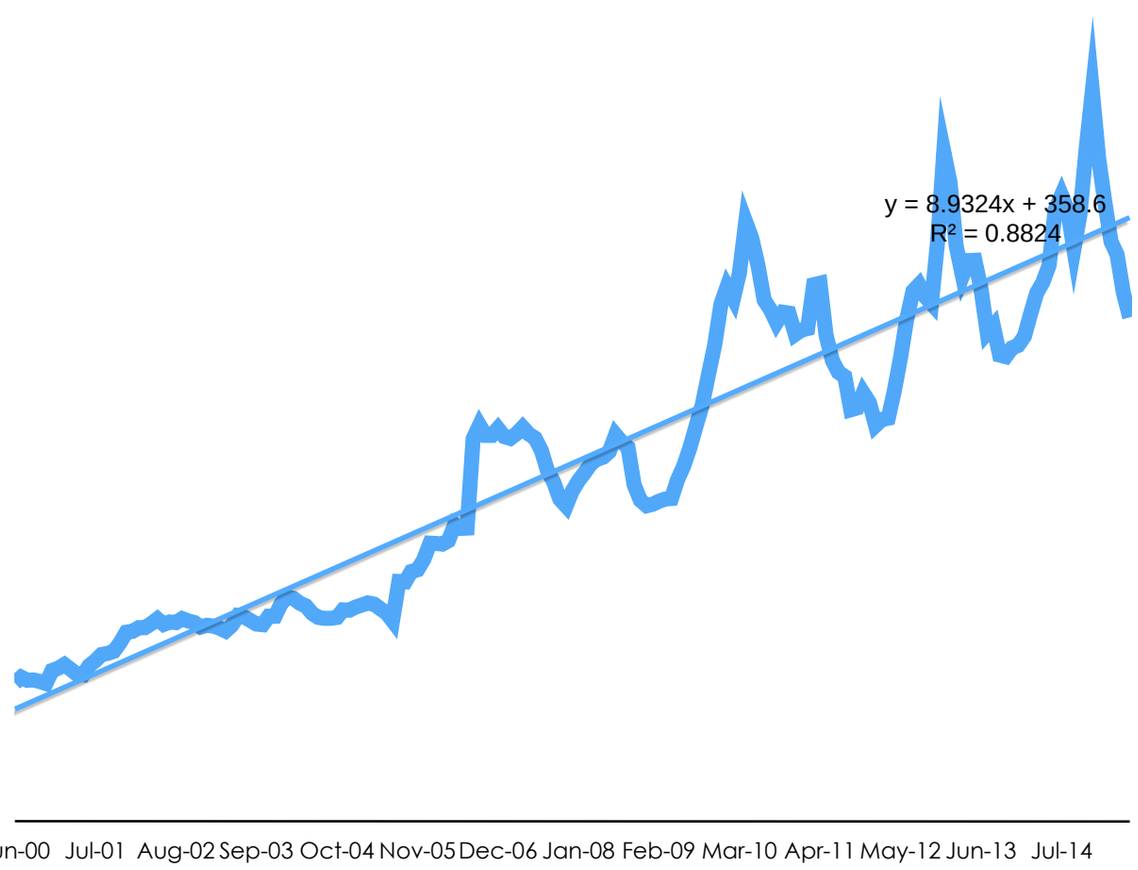
160 tonnes of dead fish found in farms along Johor Straits

Source: USDA, Index Mundi, JFD Analysis

Fishmeal prices and volatility permanently increasing

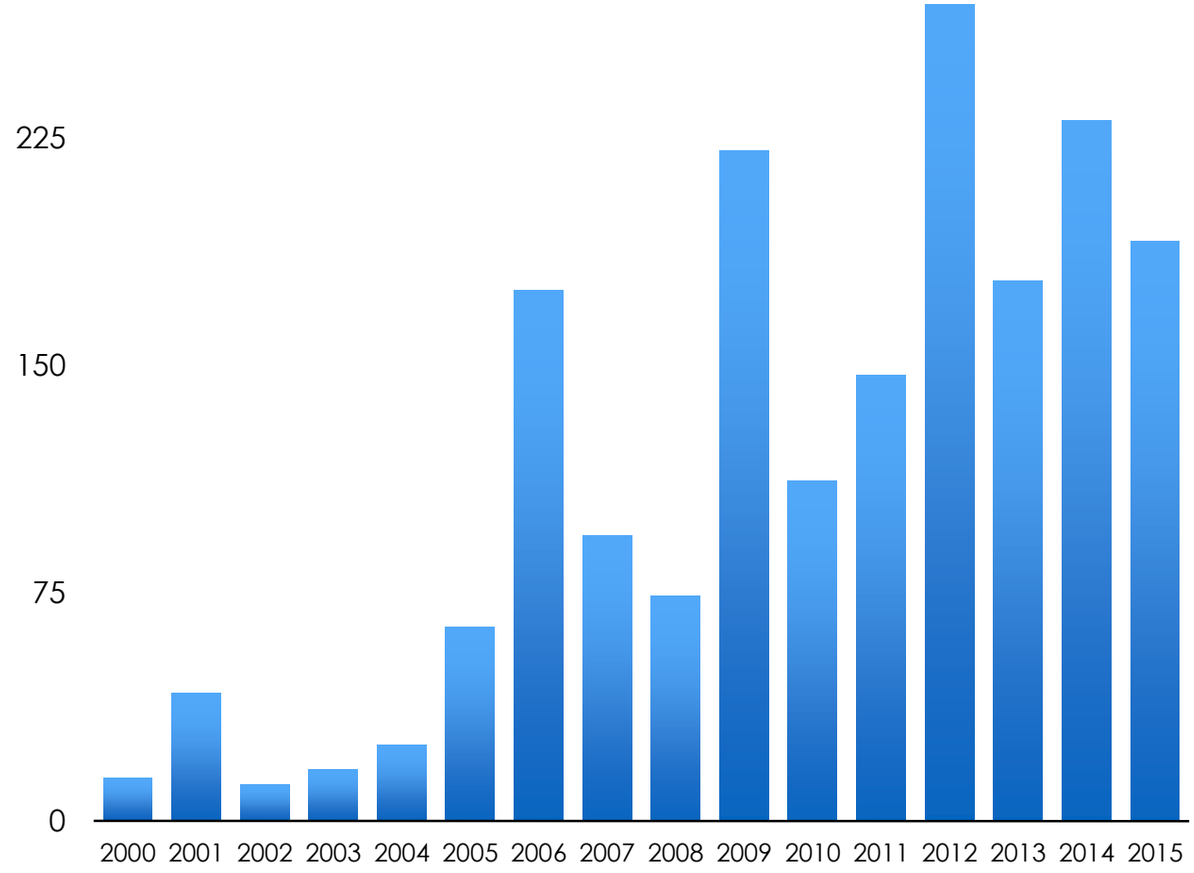
Prices increase ~$108/year

Peruvian Fishmeal Price since 2000 USD / Ton

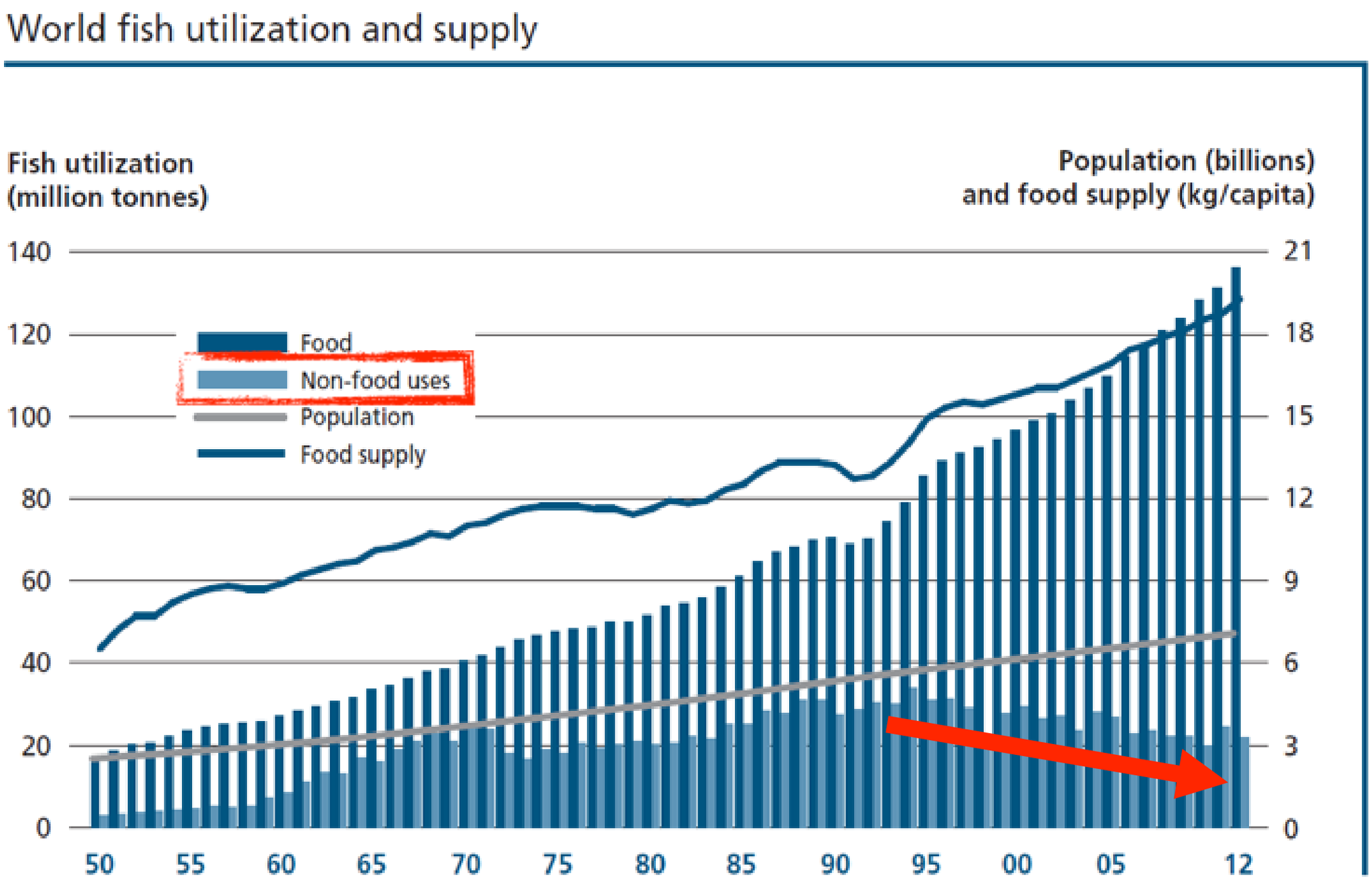


Volatility $188/year

Fishmeal Price Volatility USD / Ton



Fish available for non food uses declining



Source: FAO

We can expect continued raw material price volatility

El Nino	Uncertain anchoveta quota and harvest
	Corn, soy and wheat harvest also uncertain
	Drier weather in SE Asia
	More extreme weather
Regulatory enforcement	Fishing block out periods in Thailand
	Anti-slavery campaign
	Illegal fishing in Indonesia
China	Economic uncertainty affects demand for raw material
	Potentially affects demand for finished goods

Manufacturing costs rising

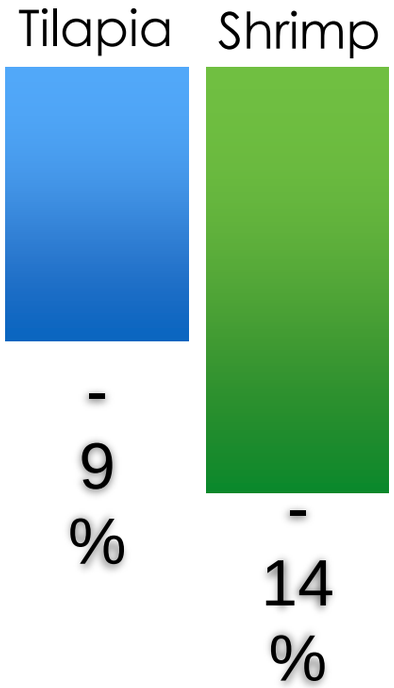
Indonesia: 2015 vs 2014

Fish Meal (Local)	Minimum Wage	Electricity	Fuel	IDR:USD
23%	22%	13%	6%	20%
	CAGR 2013-2015: ***28%***			

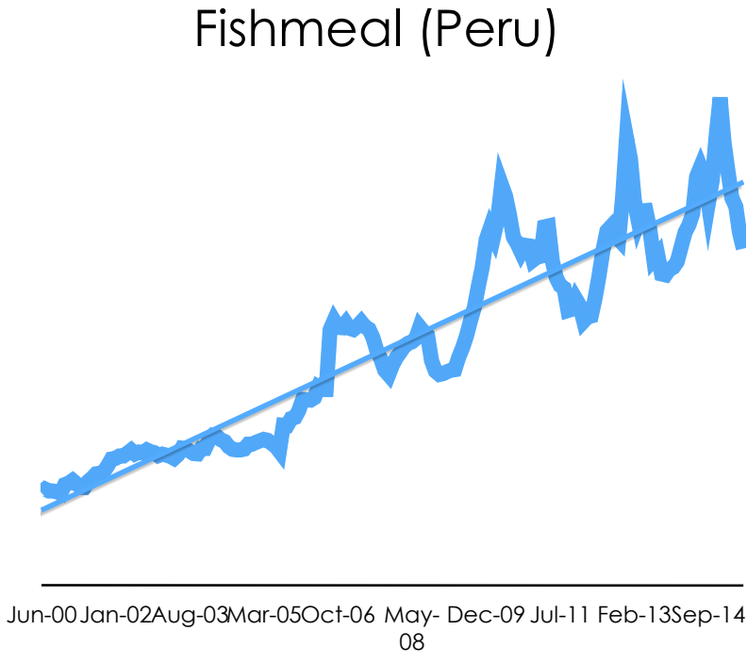
Feed prices will continue to increase over time

Market Conditions Today

Lower Prices



Higher Costs



Disease

160 tonnes of dead fish found in farms along Johor Straits

Source: USDA, Index Mundi, JFD Analysis

“Environmental” pathogens new threat to aquaculture

ONCE THERE, ALWAYS THERE

Direct Impact:

Harmful Algal Blooms (HAB)

160 tonnes of dead fish found in farms along Johor Straits

China's largest algal bloom turns the Yellow Sea green

The algae, which can suffocate marine life, is thought to be caused by pollution from agriculture and industry

Potential implications for Asian aquaculture:

- Diseases more pervasive than viral outbreaks of the past
- Net pen aquaculture exposed to novel pathogens from polluted water bodies
- Environmental pathogens more difficult to control, can spread more broadly

Indirect Impact:

Aquatic eutrophication promotes pathogenic infection in amphibians

Pieter T. J. Johnson*†, Jonathan M. Chase‡, Katherine L. Dosch§, Richard B. Hartson§, Jackson A. Gross¶, Don J. Larson‖, Daniel R. Sutherland**††, and Stephen R. Carpenter§

Johnson *et al* (2007)

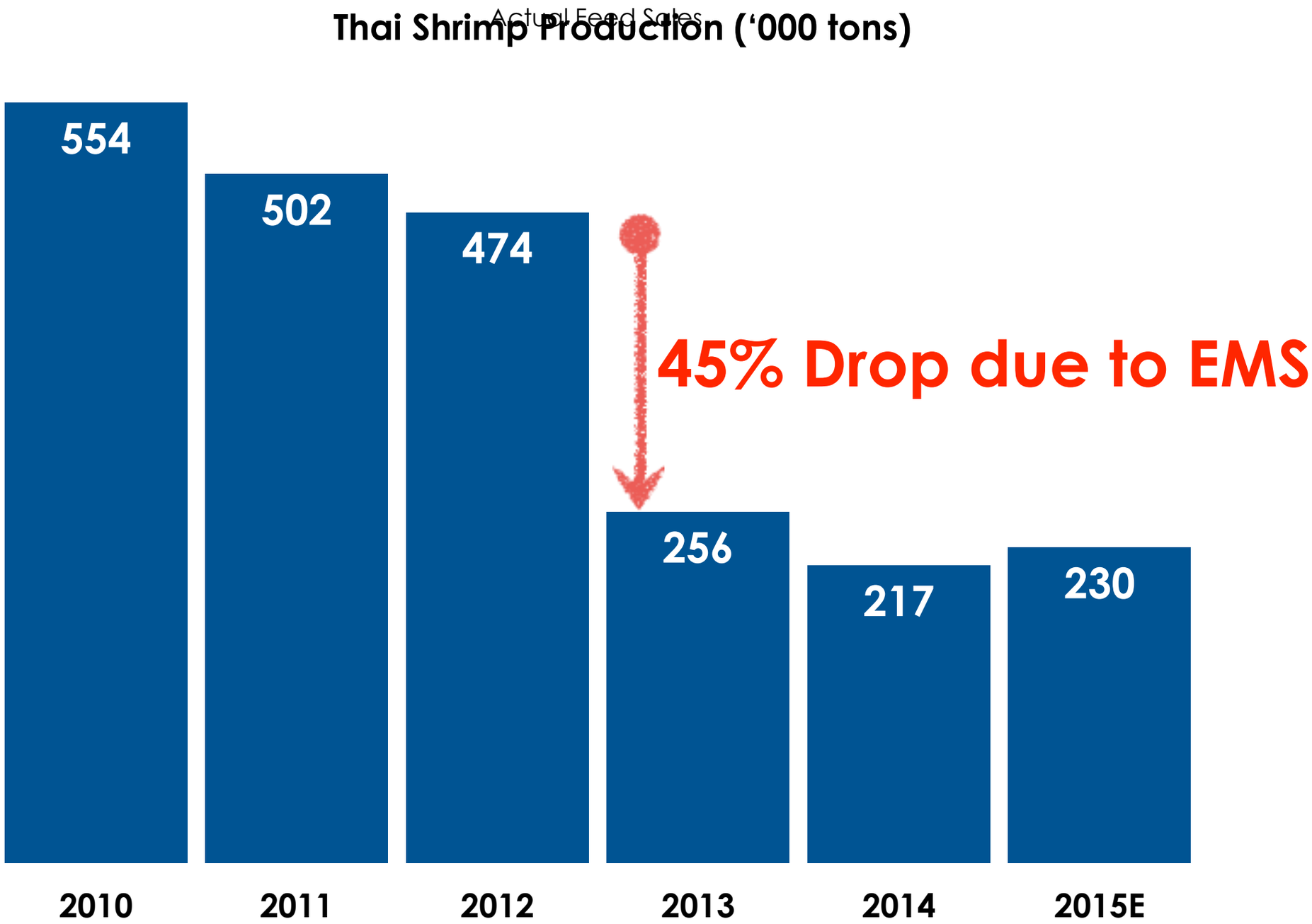
Two effects:

1) Increased growth of intermediate hosts
2) Increased production of larvae (cercariae)

Are current shrimp diseases environmental pathogens?

- AHPND - vibrio (environmental pathogen)
- White Faeces - unknown cause
- EHP - parasitic fungus, intermediate host?

WARNING: What happens when you don't farm sustainably



The Right Approach: IMNV improved Indonesia shrimp farming

After IMNV outbreak in mid 2000s:

- Weaker farms closed
- Successful farms implemented better management practice (BMP):
  - Fully lined, plastic or concrete
  - Central drain
  - Inbound water treatment
  - SPF PL
  - Responsive feeding
  - Biolab on site
- Government controls on movement of live animals into and within country

Indonesia in 2015:

- High stocking density (500+)
- Pioneers in ultra-high density pond culture
- Leaders in application of biofloc
- Still facing disease (IMNV, WSSV, White Faeces) but "dealing with it"

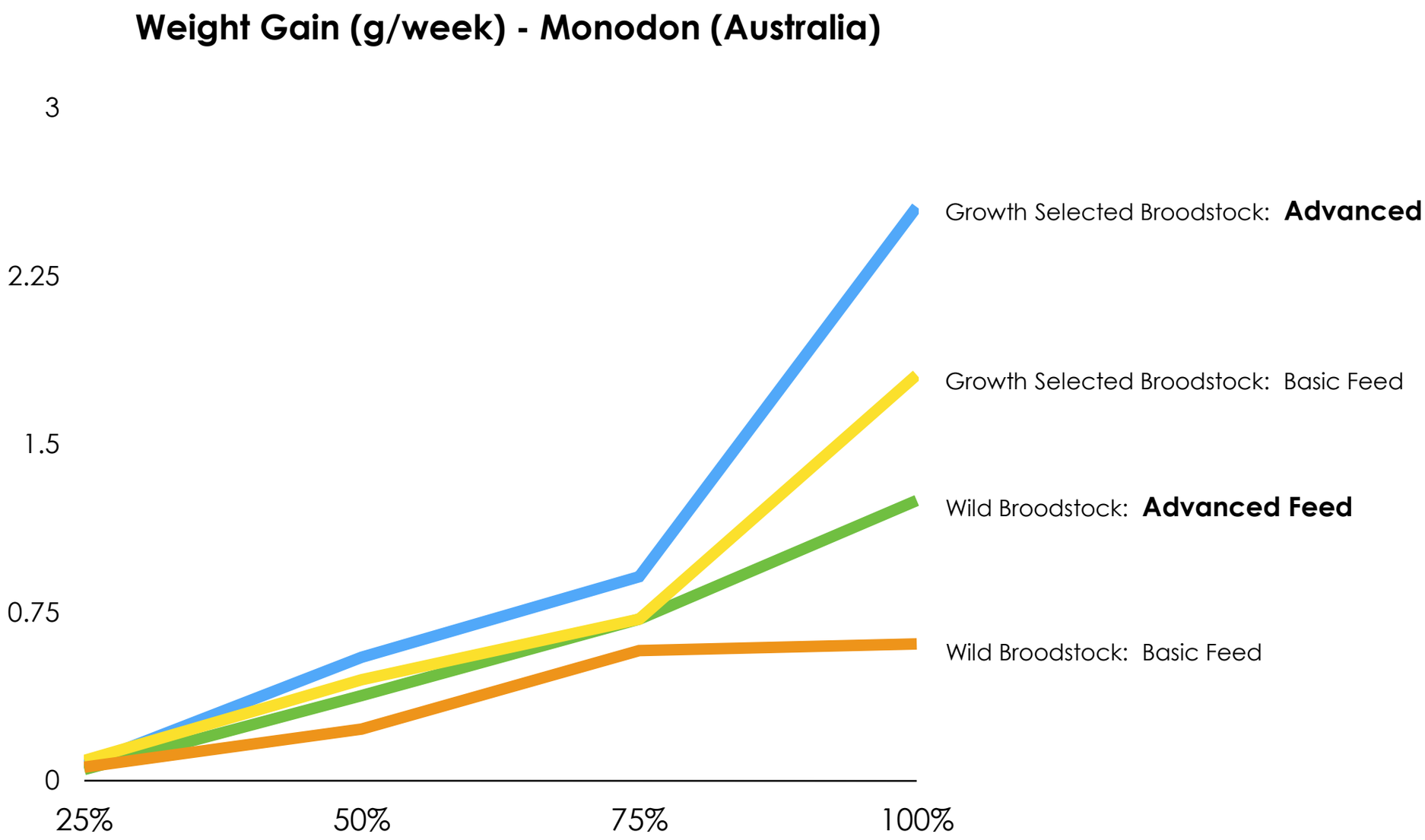
Additional Observations

Observations on the economics of shrimp farming

Focus on PRODUCTION MAXIMIZATION, not cost minimization

- Value of the shrimp much higher than primary cost inputs (esp. feed)
- Non-linear price curve - higher value for larger shrimp
- Production maximization a function of :
  - High quality PL
  - High performance feed
  - Good farm management / husbandry
  - Good farm conditions (equipment in good condition, ponds in good condition)

Performance advantage from better feed and genetics



Source: Glencross *et al* 2004

Observations on the economics of shrimp farming - Example

Table 1

	Basic Feed	**Advanced Feed**
PL Stocked	100,000	100,000
Growth / Week (g)	0.61	1.25
Weeks of Growth	20	20
Avg Size of Shrimp (g)	12	25
Total Biomass (Kg)	1,220	2,500
Value per KG	5.50	7.00
Total Value at Harvest (USD)	6,710	17,500
Cost of Feed: USD/Kg	1.15	1.45
FCR	1.5	1.3
Total Feed Used (kg)	1,830	3,250
Feed Cost USD	2,105	4,713
Economic Assessment		
Difference: Harvest Value		10,790
Difference: Feed Cost		2,608
Return on Investment		414%

Suggestions for Sri Lanka Shrimp Farming

- **Secure your long term future by establishing and maintaining sustainable practices**
- **Establish a national brand for sustainable, clean, traceable monodon shrimp**
- **Do not introduce vannamei - at least until vannamei disease issues are resolved**