Costs and Returns for a Modelled 3000mt RAS Salmon Farm

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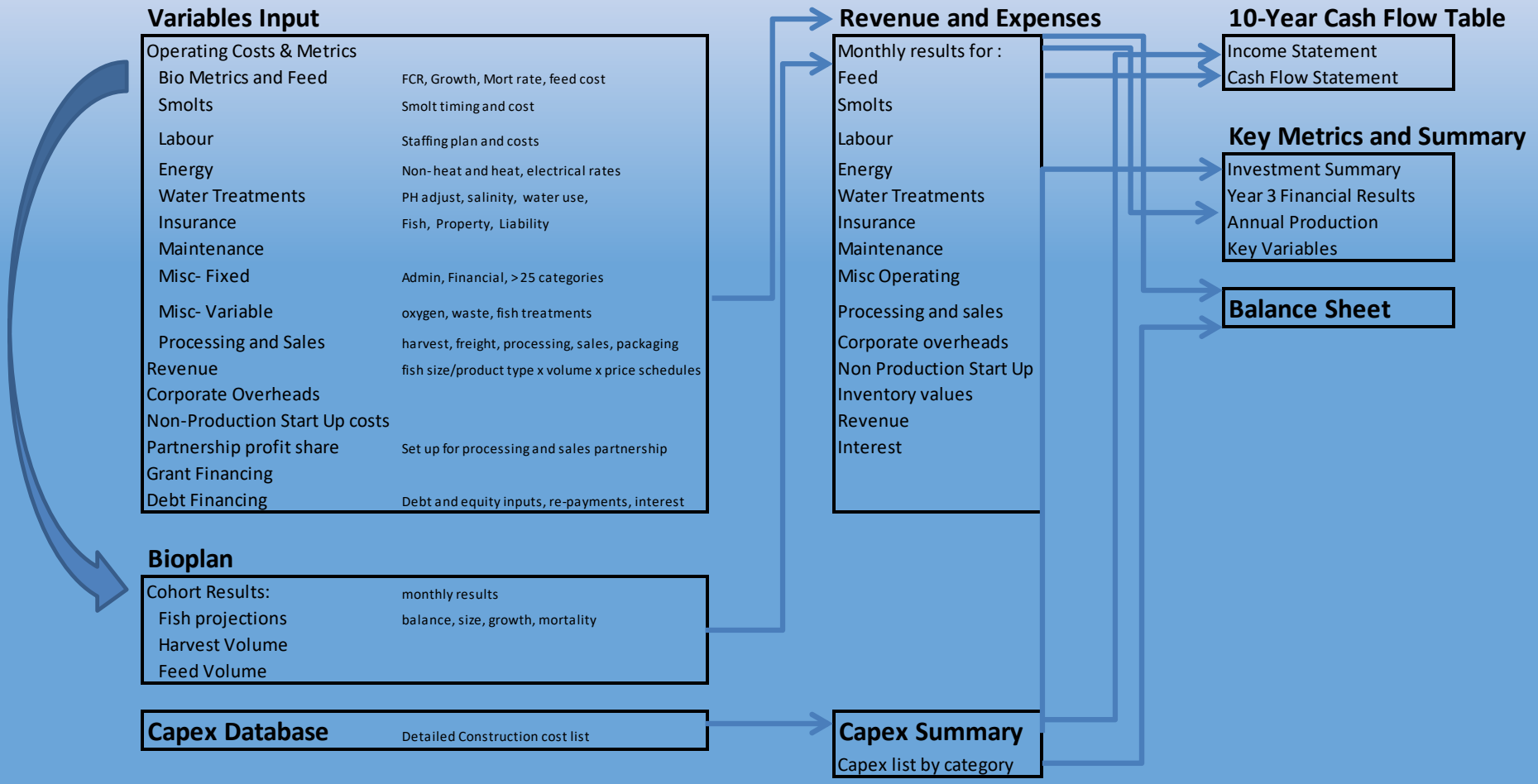
The 3000mt Excel Model



Global Cost Drivers

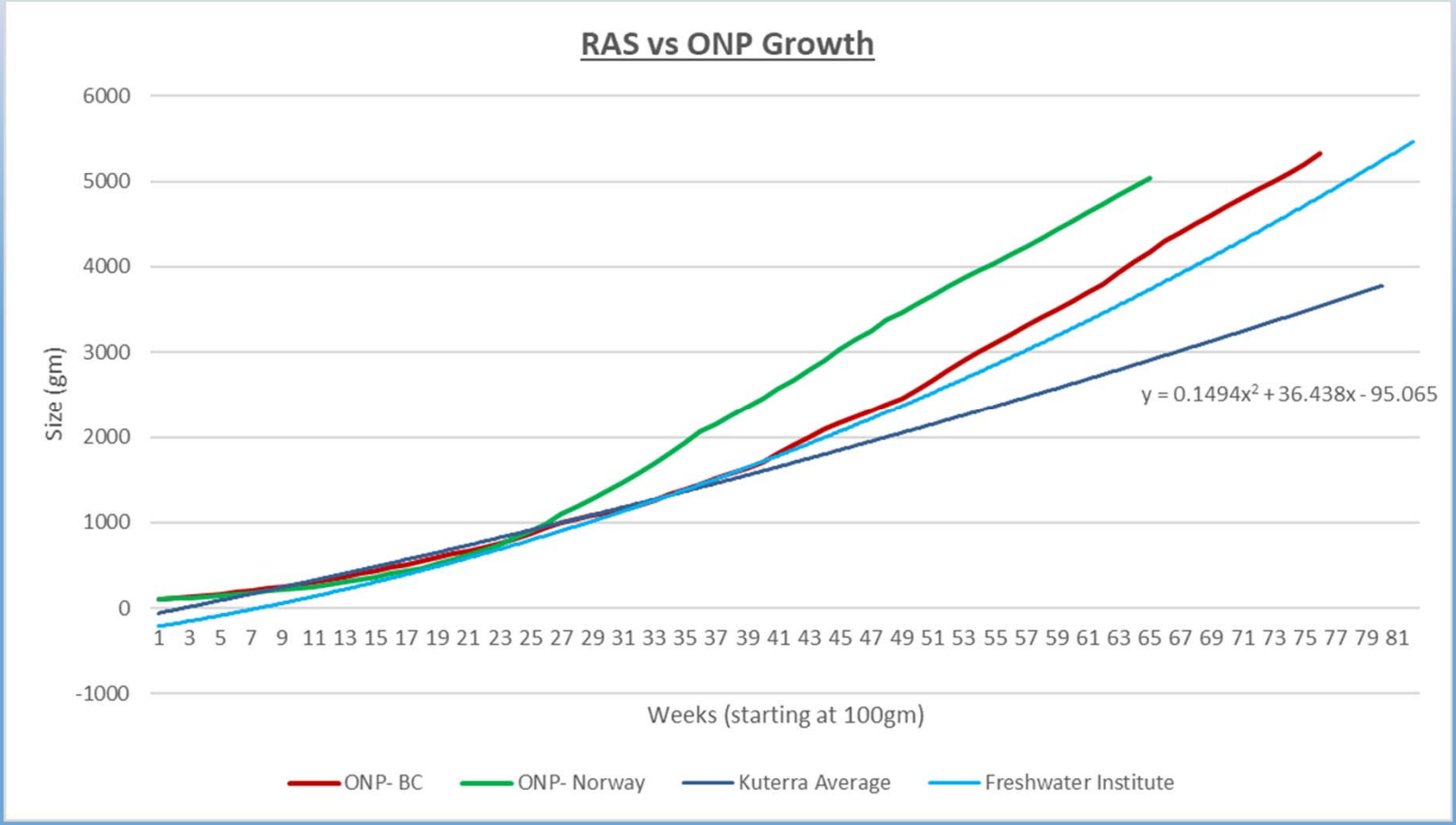
- Management team and staff
- Scale
- Risk management strategy
- Automation/ Mechanization
- Bioplan (growth, feed conversion, early maturation, rearing densities)

Recommendation: Hire the best. Hire them before start of design

Bioplan

The cornerstone of the business model

Bioplan - Growth



Recommendation: Bioplans must use growth rates that are achieved in RAS systems.

Bioplan – Growth

- Assumption: Average salmon grow rates achieved in RAS systems Underlying assumptions. TGC = 2.2
- Underlying assumptions
  - Fish harvested before maturation begins
  - “Good” water quality and husbandry
  - Healthy fish

Bioplan – Feed Conversion

- Biological FCR's close to 1.00 have been achieved at Kuterra. However, results vary considerably.
- Assumptions: 1.05 biological, 1.07 economic
- Underlying assumptions
  - Effective application of commercial feeding techniques
  - "Good" water quality and husbandry
  - Healthy fish
  - Standard commercial feed diets

Recommendation: Employ people skilled in commercial approaches to feeding market sized salmon.

Bioplan – Mortality

- 5%/ production cycle
- Underlying Assumptions
  - Good biosecurity: Disease free eggs, vaccinated smolts, disinfected supply water, etc.
  - “Good” fish husbandry
  - Stable water supply and treatment systems
  - Saltwater (or hard freshwater)

Bioplan – Other Economically Important Considerations (Not modelled)

- Water Quality
- Fish Handling Strategy
- Rearing Densities
- Photoperiod

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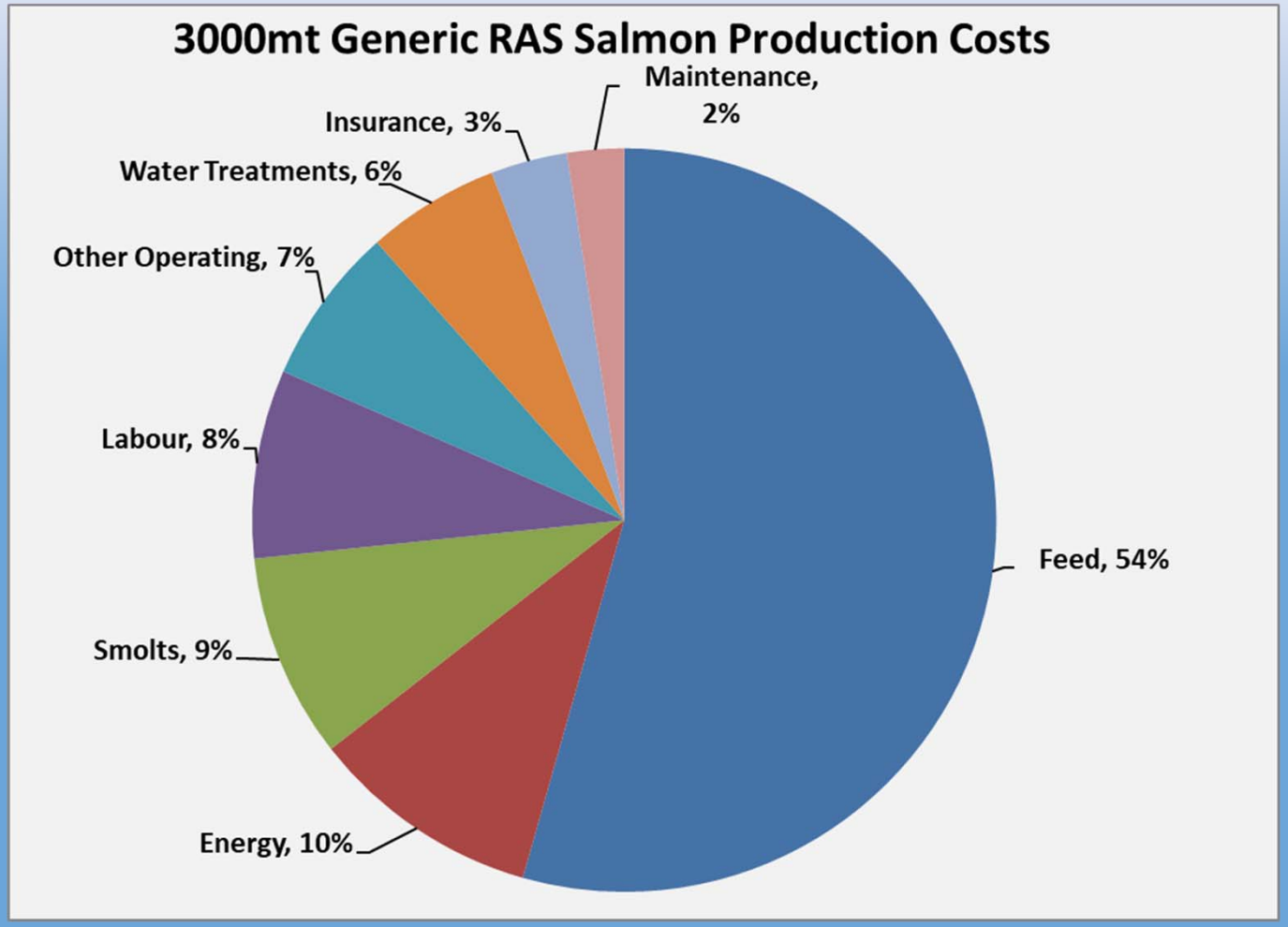
OPEX

OPEX- Cost breakdown



OPEX- Key metrics

Metric		
Feed cost	$2.0/kg	Standard diet, natural pigment, small volume pricing.
Energy Cost	$0.08/kwh	BC Hydro (Kuterra)
Energy Efficiency	5 kwh/kg	Multiple sources. Includes oxygen generation
Smolt cost	$1.75/100gm smolt	Estimated internal cost
Processing, packaging, sales and freight cost	$2.20/ kg HOG	Multiple sources.
Labour	13 people	

OPEX –Total

- Production cost: $4.6/kg HOG (Farm gate)
- Cost in the box: $6.8/kg HOG (Processed and delivered to locally)

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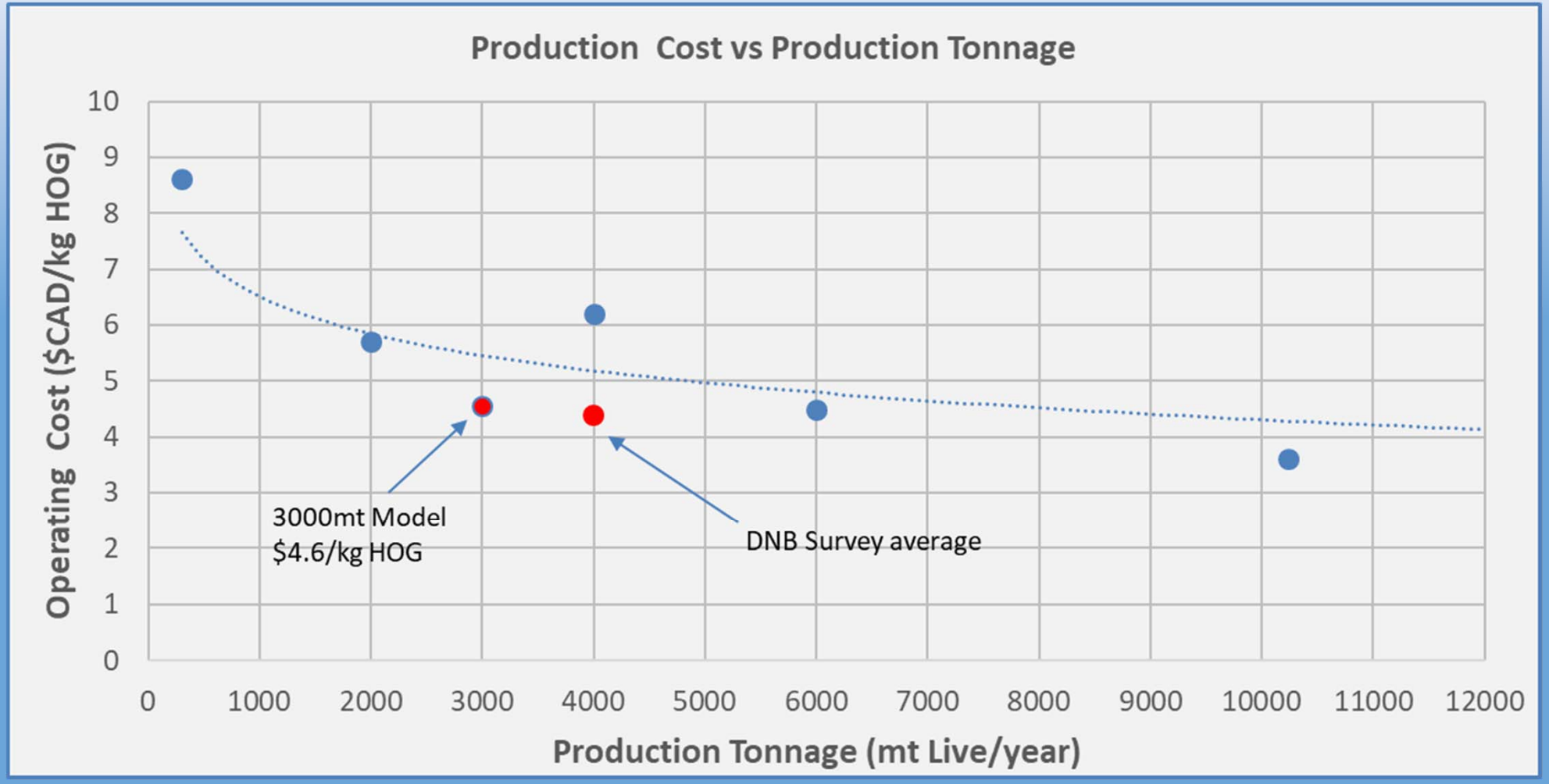
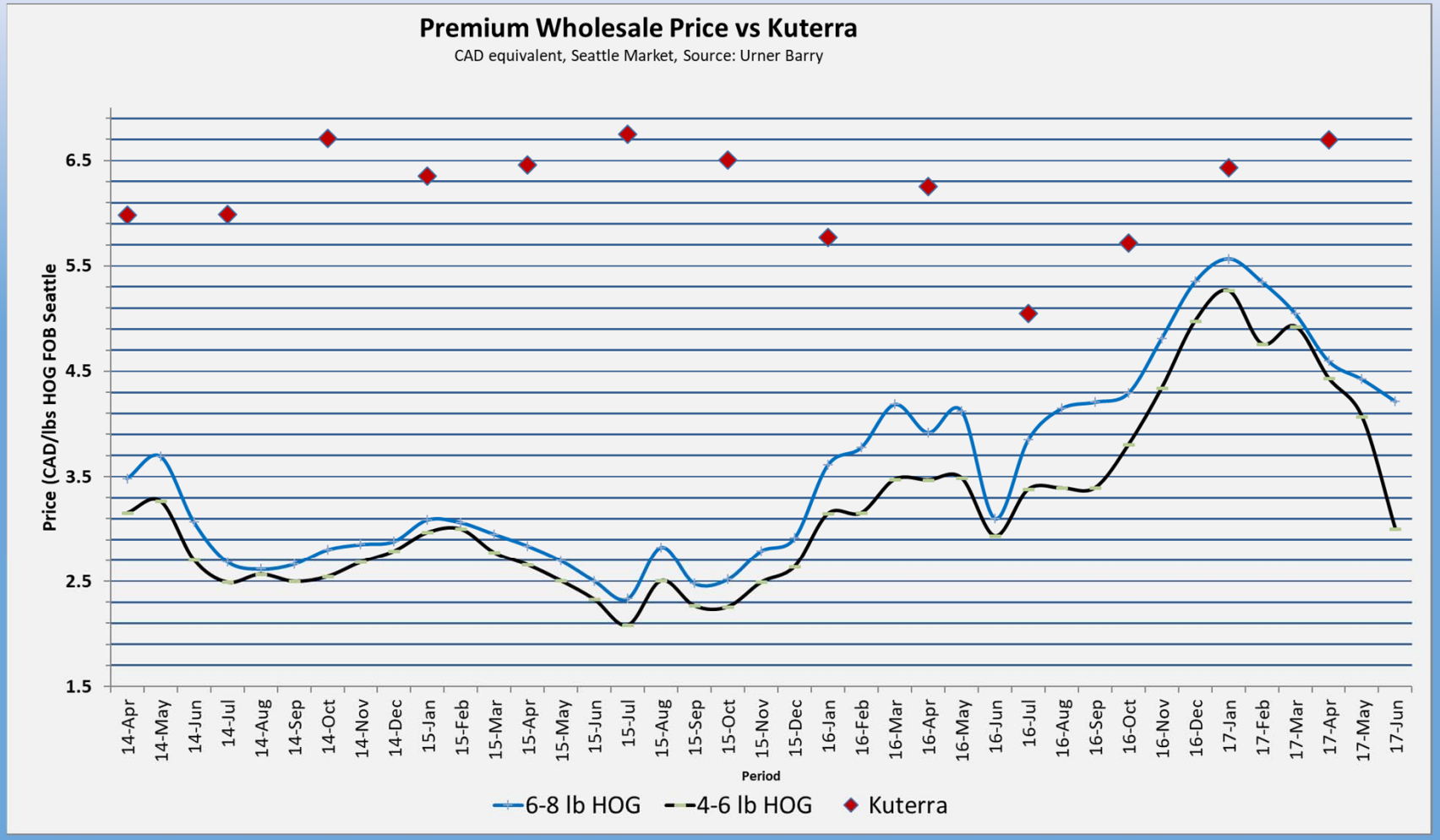
OPEX – Cost vs Scale



Revenue

Revenue


Premium Wholesale Price vs Kuterra
CAD equivalent, Seattle Market, Source: Urner Barry
Price (CAD/lbs HOG FOB Seattle
6.5
5.5
4.5
3.5
2.5
1.5
14-Apr
14-May
14-Jun
14-Jul
14-Aug
14-Sep
14-Oct
14-Nov
14-Dec
15-Jan
15-Feb
15-Mar
15-Apr
15-May
15-Jun
15-Jul
15-Aug
15-Sep
15-Oct
15-Nov
15-Dec
16-Jan
16-Feb
16-Mar
16-Apr
16-May
16-Jun
16-Jul
16-Aug
16-Sep
16-Oct
16-Nov
16-Dec
17-Jan
17-Feb
17-Mar
17-Apr
17-May
17-Jun
Period
6-8 lb HOG
4-6 lb HOG
Kuterra

Revenue- Model Assumptions

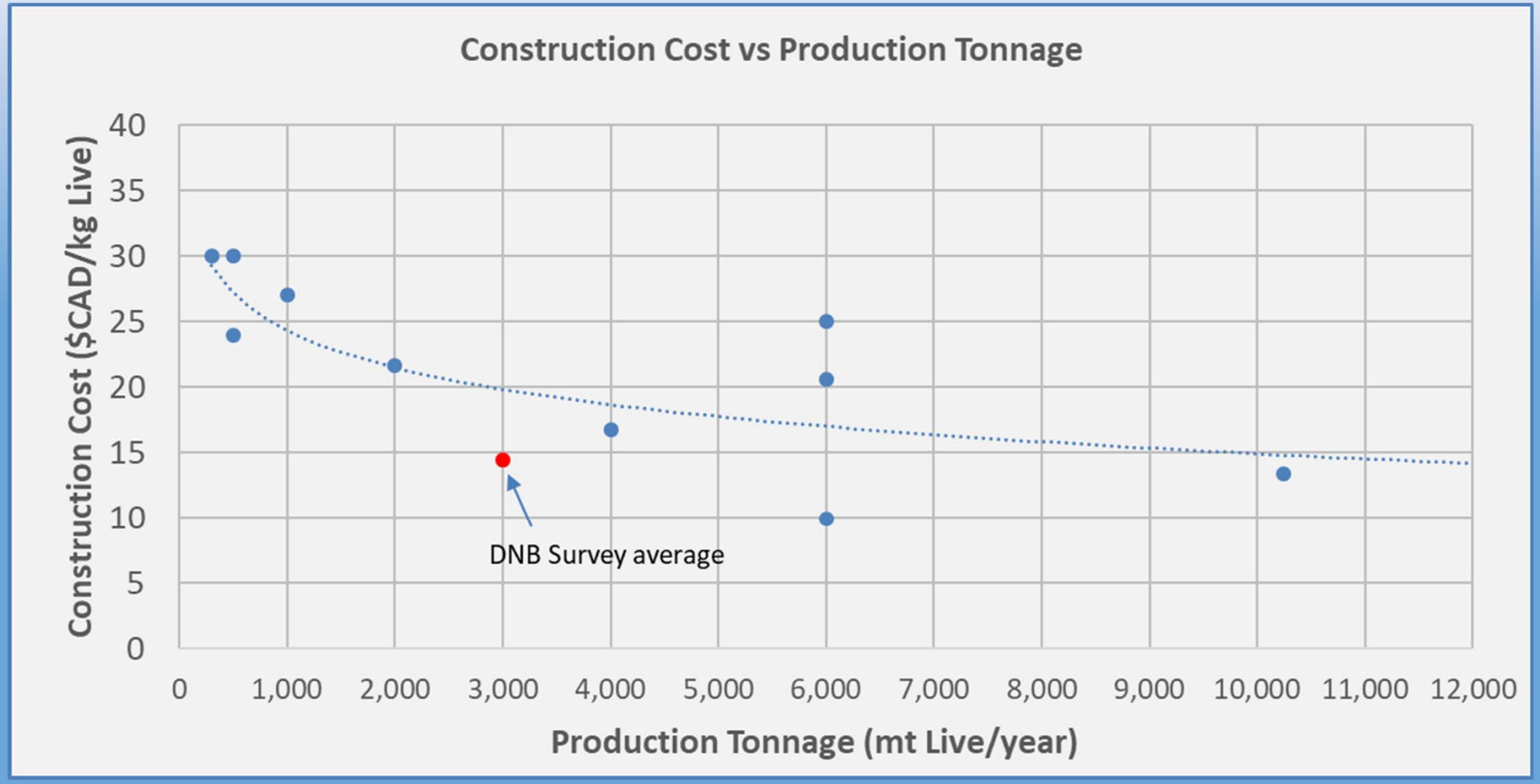
Wholesale Price	$/lb HOG	$/kg HOG
Kuterra premium grade (3 year avg.)	6.2	13.7
Kuterra all grades (3 year avg.)	5.6	12.3
Model assumption (95% premium)	6.0	13.2

CAPEX

CAPEX – key variables

- Bioplan
- Vertical integration: Hatchery, processing, waste recycling, etc.
- Local currency, regulations, services, site conditions
- Risk management: Redundancy's/ back up systems
- Scale

CAPEX – Cost vs Scale



CAPEX – 3000mt model assumptions

- Construction: $20/kg live
  - Hatchery, no processing, no advanced waste treatment
  - Average cost based on scale vs cost curve
- Inventory build up
  - $3/kg live.
  - Not included most analysis
  - Can be considered capital (budgeted as working capital)
- Land cost excluded

Returns

Returns

Financial Summary (year 3)			
	($m)	**$/kg HOG**	**$/lb HOG**
CAPEX (Construction Cost)	60.1	$20.0	$9.1
Revenue	34.1	$13.2	$6.0
OPEX			
Farming Expenses	11.8	$4.6	$2.1
Processing Packaging, Sales and Freight	5.7	$2.2	$1.0
Total Production Expenses	17.5	$6.8	$3.1
Corporate overheads	0.1	$0.0	$0.0
Total Expenses	17.5	$6.8	$3.1
Returns (unleveraged)			
EBITDA	16.6	$6.4	$2.9
Return on Capital	**28%**		
Inventory build up cost	9.1	$3.0	$1.4
Return on Capital Employed	**24%**		

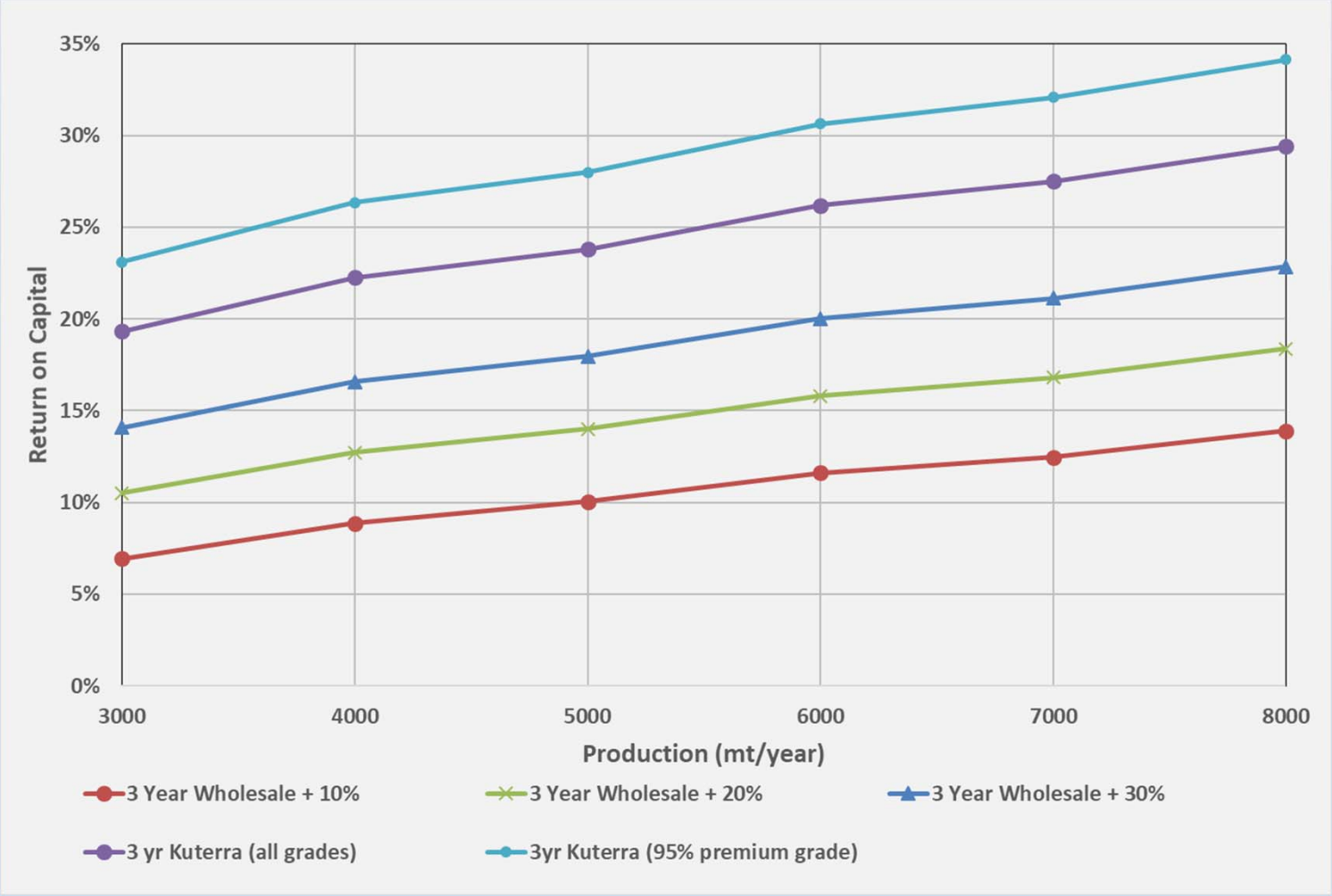
However !

- Price premium in the future may be lower due to:
  - Challenges in the market to sustainability ranking
  - Added RAS volumes

- Capital and operating costs will continue to drop due to increasing scale and other technology refinements

Return on Capital vs Scale at Different Price Premiums

(using composite Capex and Opex data)




Thank you