

# Mango cost of production benchmark study

For GIZ/ MOAP

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**giz**

With Support from

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## Project Goals

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- To provide a detailed economic analysis of the cost of production of mango in Ghana and profitability per ha and per Kg of fresh mango.
- To provide an analysis of how they are different from other countries, being Ivory Coast, Senegal and South Africa
- To answer the following research questions:
  - Why is the farm gate price for mango so much higher compared to neighboring countries?
  - If the cost of production are higher, what are the main causes?
  - Why do farmers complain of the cost of BBS control measures?
  - Why are fresh exports so low?
- To provide recommendations for mango farmers in Ghana

## Benchmarks

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1. Senegal large scale commercial export farm
2. Senegal small scale export & local market farm
3. South African large scale but low maintenance farm for processing market
4. South African high-density intensive farm for air freight export, local market and processing
5. Ivory Coast small scale low maintenance farm
6. Ghana medium sizes farm in Eastern/ Central/ Volta region
7. Ghana medium sized farm in Brong Ahafo region
8. Ghana with 30% of crop in the minor season

# Production volumes

## Brong Ahafo

Production Volumes				
Size of orchard	10	ha		
Yield per ha	7,5	tons/ha		
Processing	72%	5,4 tons/ha	54	tons
local market	20%	1,5 tons/ha	15	tons
rejects	8%	0,6 tons/ha	6	tons
<b>Total production</b>	<b>100%</b>	<b>7,5 tons/ ha</b>	<b>75</b>	<b>tons</b>

## Central & Volta

Production & Sales Volumes				
Size of orchard	20	ha		
Yield per ha	10	tons/ha		
Total production	200	Tons		
	% of production	rejects	Sales in t/ha	Total sales
Processing	60%	10%	5,40	54,00
local market	20%	0%	2,00	20,00
Export	20%	10%	1,80	18,00
<b>Total Sales</b>	<b>100%</b>		<b>9,20</b>	<b>92,00</b>

# Ghana Brong Ahafo farm economics

Profit and loss							
REVENUES		tons	price/kg	Revenue per Ha	Per Kg	TOTAL FARM	
Processing		5,4	0,255 *	1 377	0,18	13 770	
local market		1,5	0,17 *	255	0,03	2 550	
rejects		0,6	0	-	0,00	-	
<b>TOTAL REVENUES</b>				<b>1 632</b>	<b>0,22</b>	<b>16 320</b>	
VARIABLE COST							
Variable Cost: inputs	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM
Foliage fertiliser Bioset	kg	8,5	1,25		10,625	0,001	106
chicken litter	25kg bag	0,51	160,00		82	0,011	816
cocoa feed fertiliser	bags	14,45	8		116	0,015	1 156
Urea	bags	13,26	2,5		33	0,004	332
potassium nitrate	kg	1,224	10,00		12	0,002	122
Biohold 1x	litres	22,1	5,00		111	0,015	1 105
fruitfly trap 4	tablets	2,55	40,00		102	0,014	1 020
herbicide	litres	3,4	2,50		9	0,001	85
BBS copper spray 5x	litres	6,8	6,25		43	0,006	425
fruitfly spray 1x	litres	6,8	1,25		9	0,001	85
stoneweavil Acetastart 1:	litres	10,2	1,25		13	0,002	128
<b>SUB TOTAL: INPUTS</b>		<b>29,75</b>			<b>538</b>	<b>0,072</b>	<b>5380</b>
Variable Cost: labour	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM
Pruning	tree	0,85	160,0	1	136	0,018	1 360
pruning wood gathering	h	0,17	1250,0	12	213	0,028	2 125
Fertilisation ground	working day/ year	5,1	8,0		41	0,005	408
herbicide spraying 1x	working day/ year	5,1	1,0		5	0,001	51
Manual weeding 2x	working day/ year	5,1	12,0	1	61	0,008	612
spraying 11 rounds	working day/ year	5,1	11,0		56	0,007	561
harvesting (0,66ton/mar	working day/ year	10,2	11,4	1	116	0,015	1 159
fence maintenance	working day/ year				0	0,000	-
<b>SUB TOTAL: INPUTS</b>					<b>628</b>	<b>0,08</b>	<b>6276</b>
Variable Cost: other	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM
crate rental	35kg crate	0,17	214,29		36,42857143	0,005	364
<b>SUB TOTAL: OTHER</b>					<b>36</b>	<b>0</b>	<b>364</b>
<b>TOTAL VARIABLE COST</b>					<b>1 202</b>	<b>0,16</b>	<b>12 020</b>
<b>GROSS MARGIN</b>		<b>26%</b>			<b>430</b>	<b>0,06</b>	<b>4 300</b>
FIXED COST for the entire orchard							
Fixed staff	No. of staff	Salary/month	no. months	total cost	Cost/ ha		
<b>SUB TOTAL FIXED STAFF</b>					-	-	-
Other fixed cost							
	% of capex	capex					
Insurance	2%	-			-	-	-
Maintenance	2%	-			-	-	-
Depreciation	10	127			127	0,02	1 274
Working capital interest					-	-	-
Phone cost				204	20	0,00	204
<b>TOTAL FIXED COSTS</b>				<b>204</b>	<b>148</b>	<b>0,02</b>	<b>1 478</b>
<b>PROFIT BEFORE TAX</b>		<b>17%</b>			<b>282</b>	<b>0,04</b>	<b>2 822</b>

# Volta farm economics

Profit and loss									
REVENUES		tons	price/kg	Revenue per Ha	Per Kg	TOTAL FARM			
Processing		5,40	0,255	1 377	0,14	27 540			
local market		2,00	0,17	340	0,03	6 800			
Export		1,80	0,374	673	0,07	13 464			
<b>TOTAL REVENUES</b>				<b>2 390</b>	<b>0,23902</b>	<b>47 804</b>			
VARIABLE COST									
Variable Cost: inputs	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM		
Follage fertiliser biocide	kg	8,5	1,25		10,625	0,001	213		
compost	tons	25,5	2,5		64	0,006	1 275		
nutribond	bags	11,05	20		221	0,022	4 420		
potassium nitrate/ bioset 4x	kg	1,224	20		24	0,002	490		
biohold 1x	litres	22,1	5		111	0,011	2 210		
fruitfly trap 4x	tablets	2,55	40		102	0,010	2 040		
herbicide 2x	litres	3,4	5		17	0,002	340		
BBS copper spray 5x	litres	6,8	6,25		43	0,004	850		
fruitfly spray 1x	litres	6,8	1,25		9	0,001	170		
stoneweavil acetastart 1x	litres	10,2	1,25		13	0,001	255		
<b>SUB TOTAL: INPUTS</b>					<b>613</b>	<b>0,061</b>	<b>12262</b>		
Variable Cost: labour	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM		
Pruning	tree	0,85	120,0	1	102	0,01	2 040		
pruning wood gathering	h	0,17	1250,0	12	213	0,02	4 250		
Fertilisation ground	working day/ year	5,1	8,0		41	0,00	816		
herbicide spraying 3x	working day/ year	5,1	1,0		5	0,00	102		
Manual weeding 2x	working day/ year	5,1	12,0	1	61	0,01	1 224		
spraying 11 rounds	working day/ year	5,1	11,0		56	0,01	1 122		
harvesting (0,66ton/manday)	working day/ year	10,2	15,2	1	155	0,02	3 091		
compost spreading	working day/ year	5,1	2,0		10	0,00	204		
<b>SUB TOTAL: LABOUR</b>					<b>642</b>	<b>0,06</b>	<b>12849</b>		
Variable Cost: other	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM		
crate rental	35kg crate	0,17	285,71		49	0,005	971		
<b>SUB TOTAL: OTHER</b>					<b>49</b>	<b>0</b>	<b>971</b>		
<b>TOTAL VARIABLE COST</b>					<b>1 304</b>	<b>0,13</b>	<b>26 082</b>		
<b>GROSS MARGIN</b>		<b>45%</b>			<b>1 086</b>	<b>0,11</b>	<b>21 722</b>		
FIXED COST for the entire orchard									
Fixed staff	No. of staff	Salary/month	no. months	total cost	Cost/ ha				
Farm manager	1	510	12	6 120	306	0,07	6 120		
Farm labour		170	12	-	-	-	-		
worker				-	-	-	-		
Mechanic				-	-	-	-		
...				-	-	-	-		
<b>SUB TOTAL FIXED STAFF</b>					<b>306</b>	<b>0,07</b>	<b>6 120</b>		
Other fixed cost									
	% of capex	capex							
Insurance	2%	-			-	-	-		
Maintenance	2%	-			-	-	-		
Depreciation	20	126			126	0,03	2 521		
Working capital interest					-	-	-		
Phone cost				204	10	0,00	204		
Fuel					-	-	-		
Certification					-	-	-		
Electricity					-	-	-		
travel					-	-	-		
<b>TOTAL FIXED COSTS</b>					<b>6 324</b>	<b>442</b>	<b>0,10</b>	<b>8 845</b>	
<b>PROFIT BEFORE TAX</b>		<b>27%</b>			<b>644</b>	<b>0,01</b>	<b>12 876</b>		

# Ghana farm economics with 33% in minor season

Profit and loss								
REVENUES		tons	price/kg	Revenue per Ha	Per Kg	TOTAL FARM		
Processing		3,75	0,255 *	956	0,13		9 563	
local market		1,25	0,17 *	212	0,03		2 125	
Minor season		2,50	0,51	1 275	0,17		12 750	
<b>TOTAL REVENUES</b>				<b>2 444</b>	<b>0,32</b>		<b>24 437</b>	
VARIABLE COST								
Variable Cost: inputs	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM	
Foliage fertiliser Bioset	kg	8,5	1,25		10,625	0,001	106	
chicken litter	25kg bag	0,51	160,00		82	0,011	816	
cocoa feed fertiliser	bags	14,45	8		116	0,015	1 156	
Urea	bags	13,26	2,5		33	0,004	332	
potassium nitrate	kg	1,224	10,00		12	0,002	122	
Biohold 1x	litres	22,1	5,00		111	0,015	1 105	
fruitfly trap 4	tablets	2,55	40,00		102	0,014	1 020	
herbicide	litres	3,4	2,50		9	0,001	85	
BBS copper spray 5x	litres	6,8	6,25		43	0,006	425	
fruitfly spray 1x	litres	6,8	1,25		9	0,001	85	
stoneweavil Acetastart 1	litres	10,2	1,25		13	0,002	128	
<b>SUB TOTAL: INPUTS</b>		<b>29,75</b>			<b>538</b>	<b>0,072</b>	<b>5380</b>	
Variable Cost: labour	Unit	Cost/ Unit	No. Units per ha	Months	Cost/ ha	Per Kg	TOTAL FARM	
Pruning	tree	0,85	160,0	1	136	0,018	1 360	
pruning wood gathering	h	0,17	1250,0	12	213	0,028	2 125	
Fertilisation ground	working day/ year	5,1	8,0		41	0,005	408	
herbicide spraying 1x	working day/ year	5,1	1,0		5	0,001	51	
Manual weeding 2x	working day/ year	5,1	12,0	1	61	0,008	612	
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fence maintenance	working day/ year				0	0,000	-	
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crate rental	35kg crate	0,17	214,29		36,42857143	0,005	364	
					0	0	-	
					0	0	-	
					0	0	-	
					0	0	-	
					0	0	-	
<b>SUB TOTAL: OTHER</b>					<b>36</b>	<b>0</b>	<b>364</b>	
<b>TOTAL VARIABLE COST</b>					<b>1 202</b>	<b>0,16</b>	<b>12 020</b>	
<b>GROSS MARGIN</b>		<b>51%</b>			<b>1 242</b>	<b>0,16</b>	<b>12 417</b>	
FIXED COST for the entire orchard								
Fixed staff	No. of staff	Salary/month	no. months	total cost	Cost/ ha			
<b>SUB TOTAL FIXED STAFF</b>								
<b>Other fixed cost</b>								
	% of capex	capex						
Insurance	2%	31 858			64	0,01	637	
Maintenance	2%	31 858			64	0,01	637	
Depreciation	10	127			127	0,02	1 274	
Working capital interest					-	-	-	
Phone cost				204	20	0,00	204	
<b>TOTAL FIXED COSTS</b>					<b>204</b>	<b>275</b>	<b>0,04</b>	<b>2 752</b>
<b>PROFIT BEFORE TAX</b>		<b>40%</b>			<b>966</b>	<b>0,13</b>	<b>9 665</b>	

## Key differences between Ghana and other producers

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Ghana is the only country in this study:

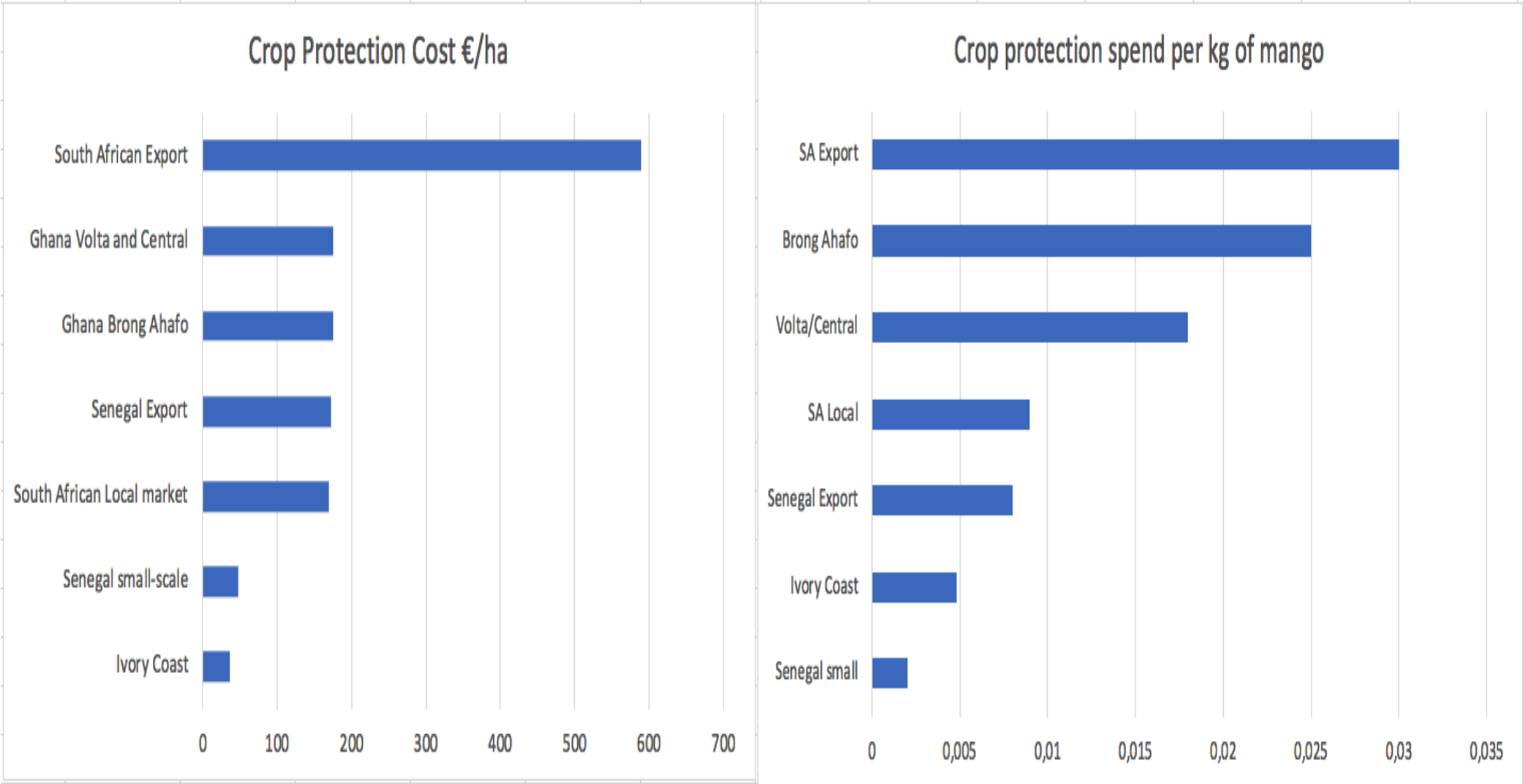
- where mango is produced in humid coastal areas
- where Keitt is the dominant variety.
- where in some regions (South Volta) there are 2 seasons on the same tree
- where an intensive farming system with high investment in inputs is used on a low-density orchard that is not supported by irrigation.
- There is hardly a lucrative export market
- Where the local fresh market price in the high season is much lower (1Ghc) than processing grade (1,5 to 1,6 GhC).

Yields in Ghana sit somewhere in-between low input models in Senegal and Ivory Coast (and Mali and Burkina Faso for that matter) that reach about 5 tons/ ha and the intensive systems of South Africa and Senegal that achieve 15-22 tons.

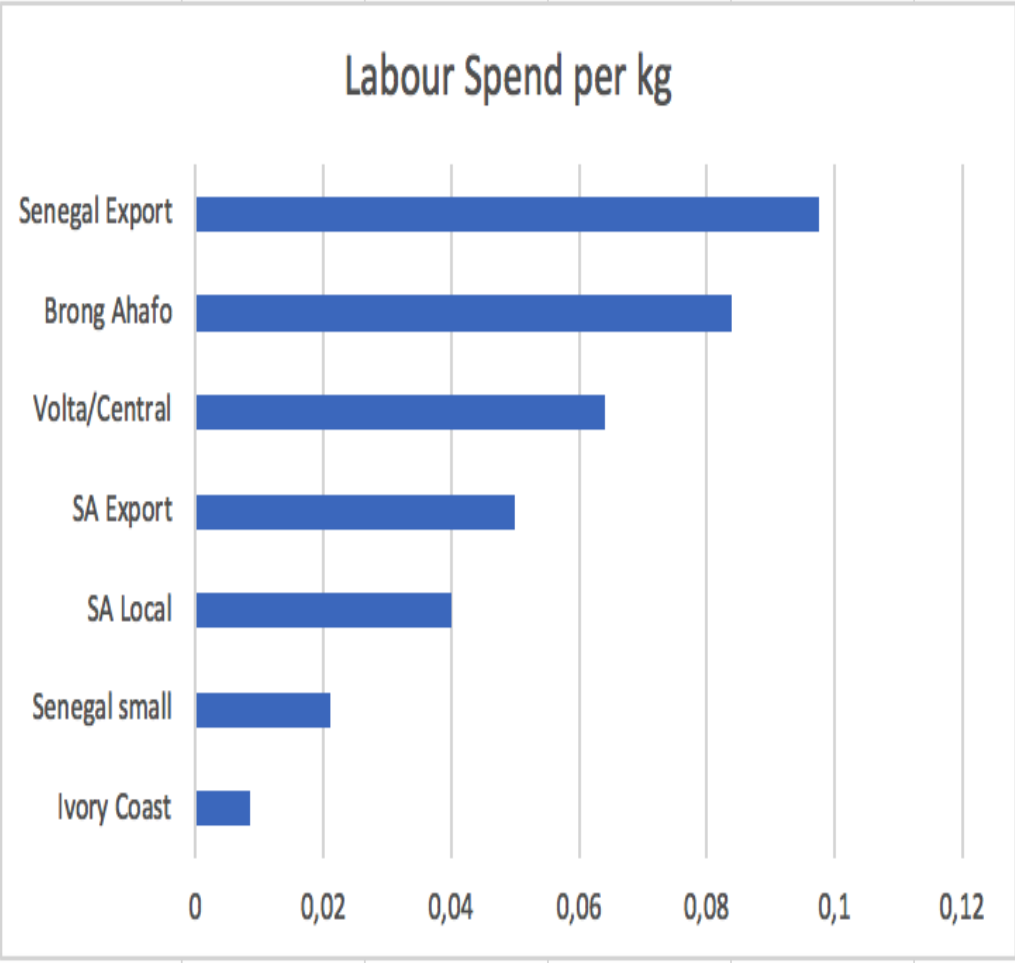
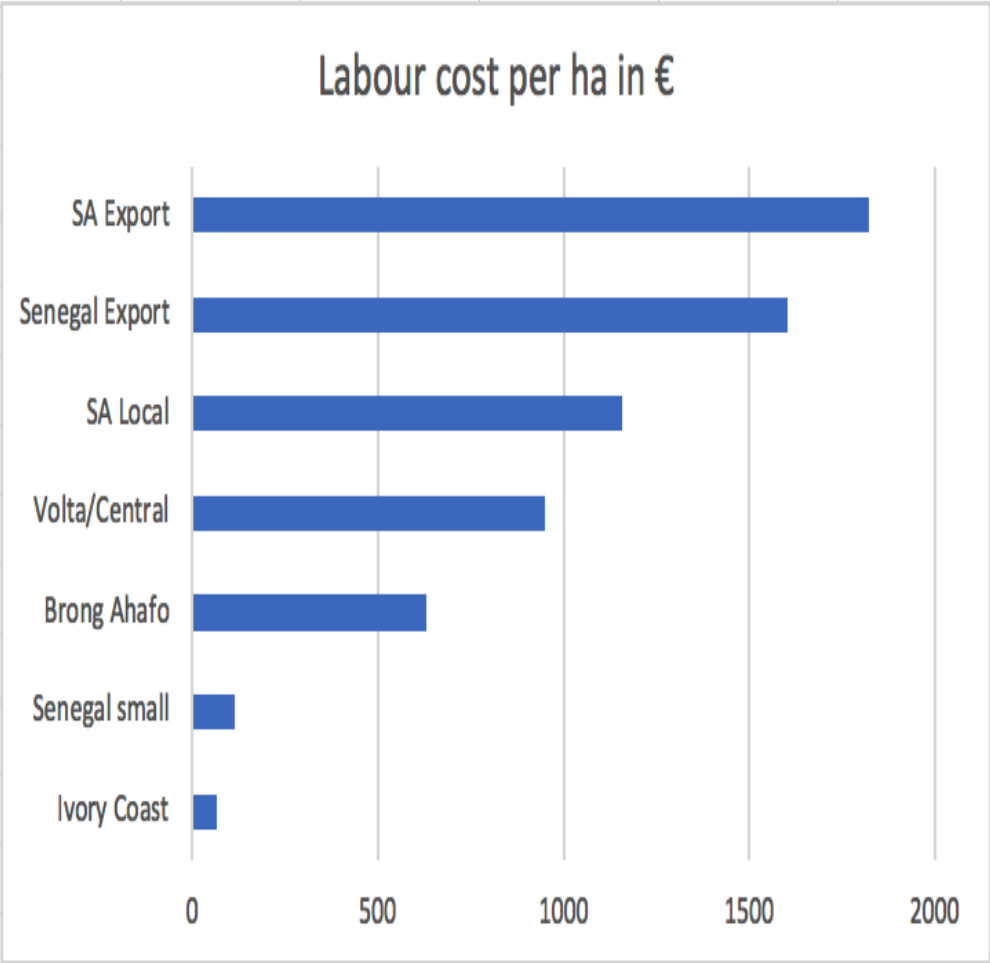
More professional Ghanaian farmers by comparison obtain about 7 – 12,5 tons per ha, with the average being definitely below 10tons per ha.



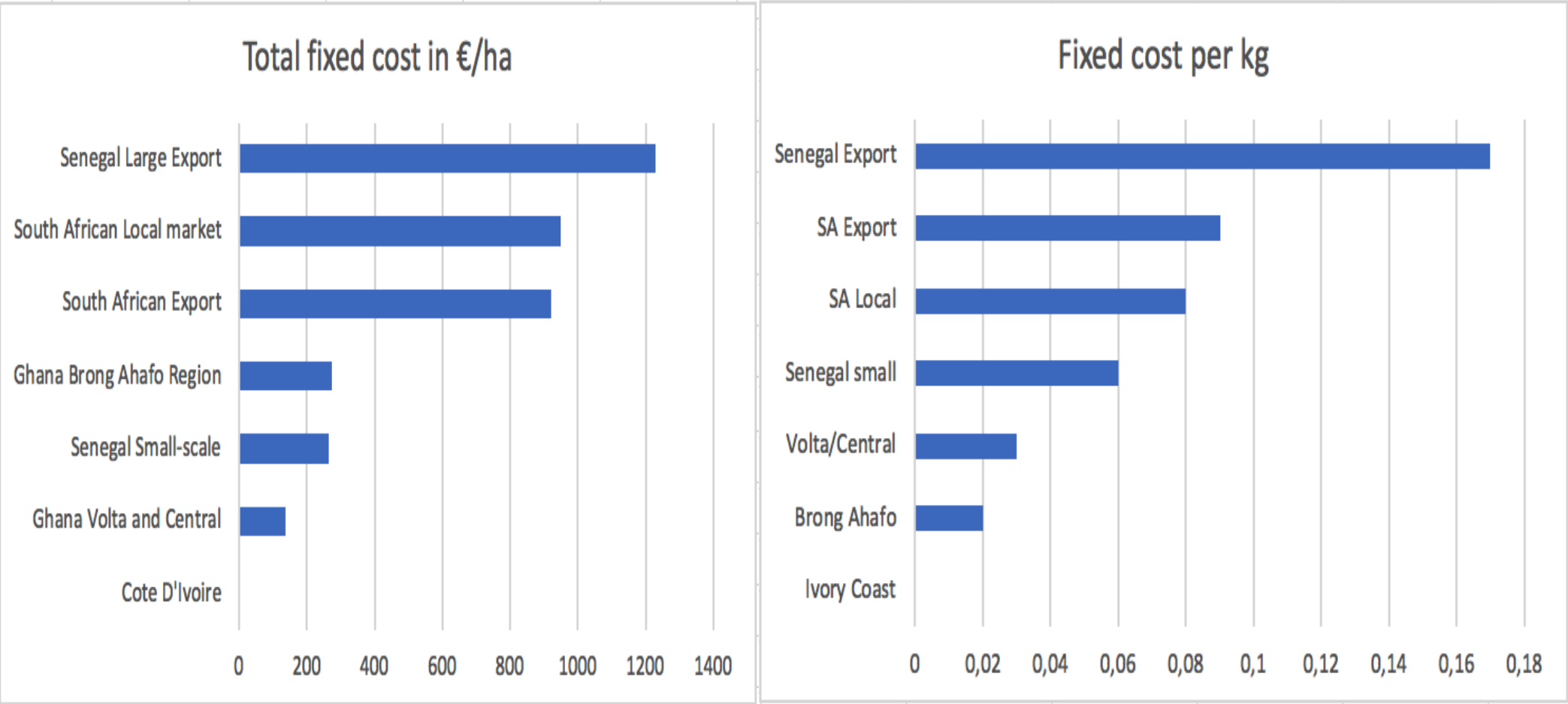
# Crop protection cost



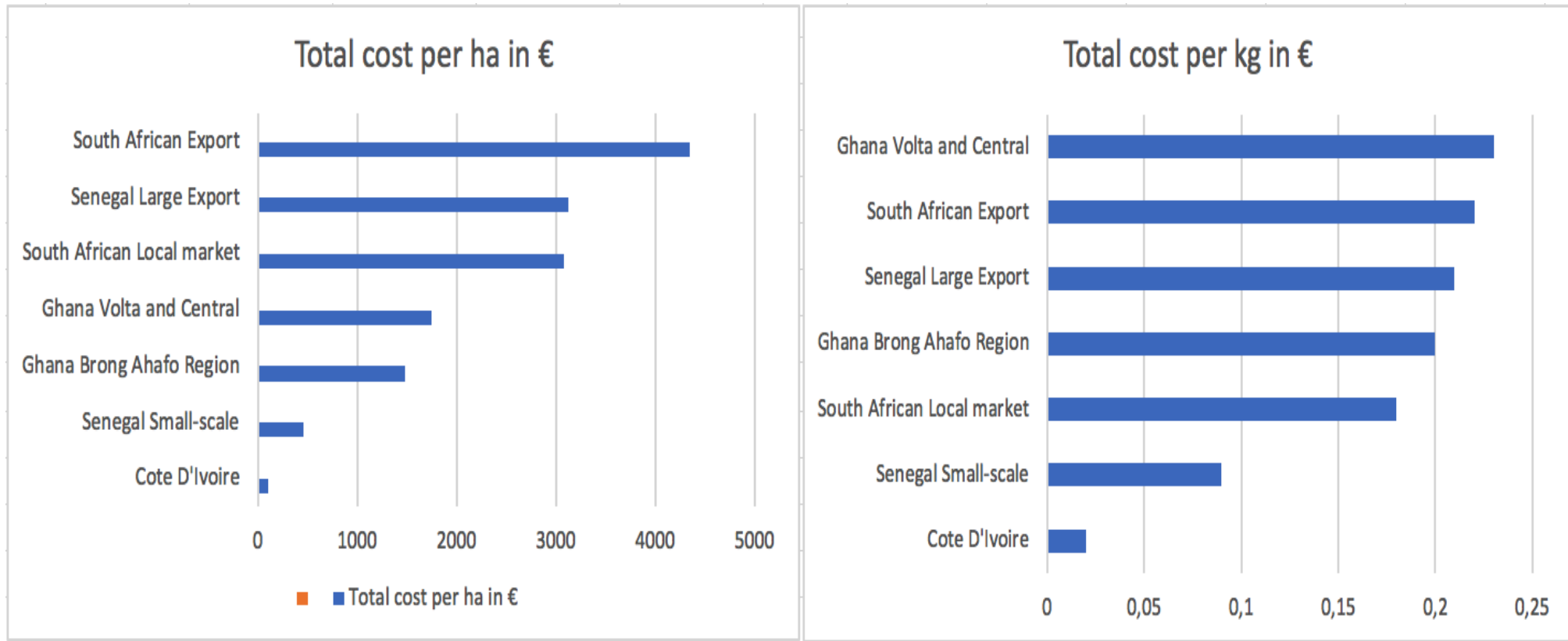
# labour cost



# Fixed cost



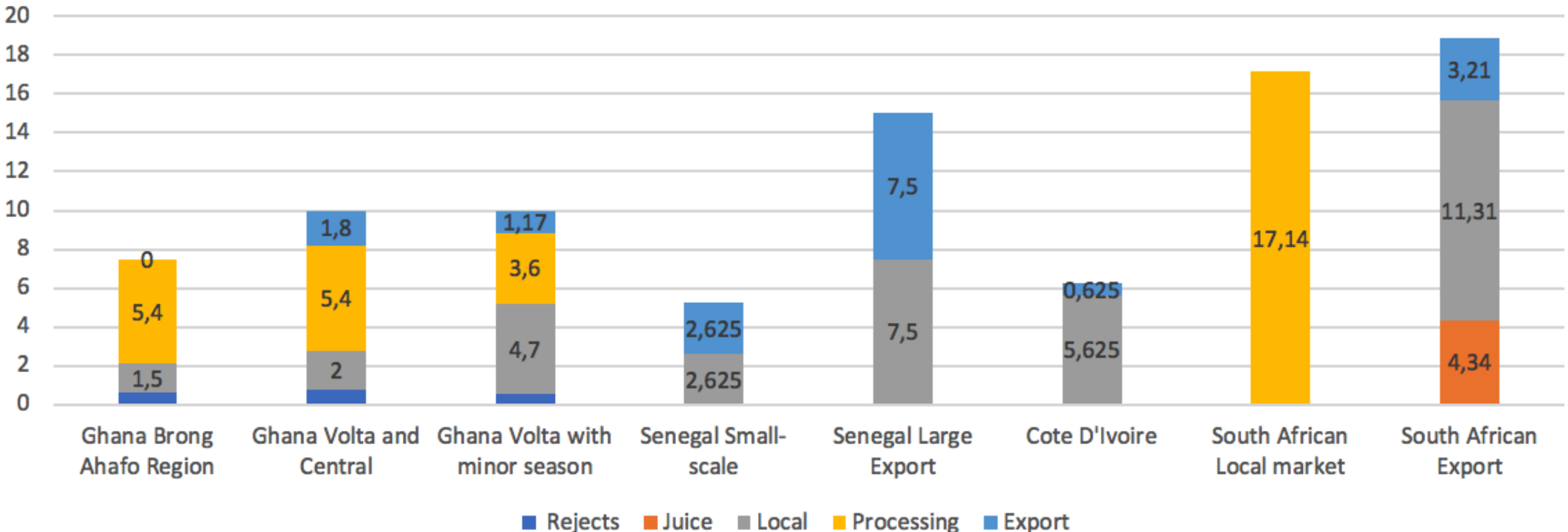
# Total cost of production



- The cost of production/kg are as high in Ghana as they are in South Africa or Senegalese intensive orchards.
- Crop protection cost in Ghana per kg of fruit do seem to be very high, while fertilizer seems low
- Labour cost per kg of fruit are again high for Ghana because of low yields but also smaller size of the orchard, so fixed staff salaries are spread over fewer ha, with lower yields.

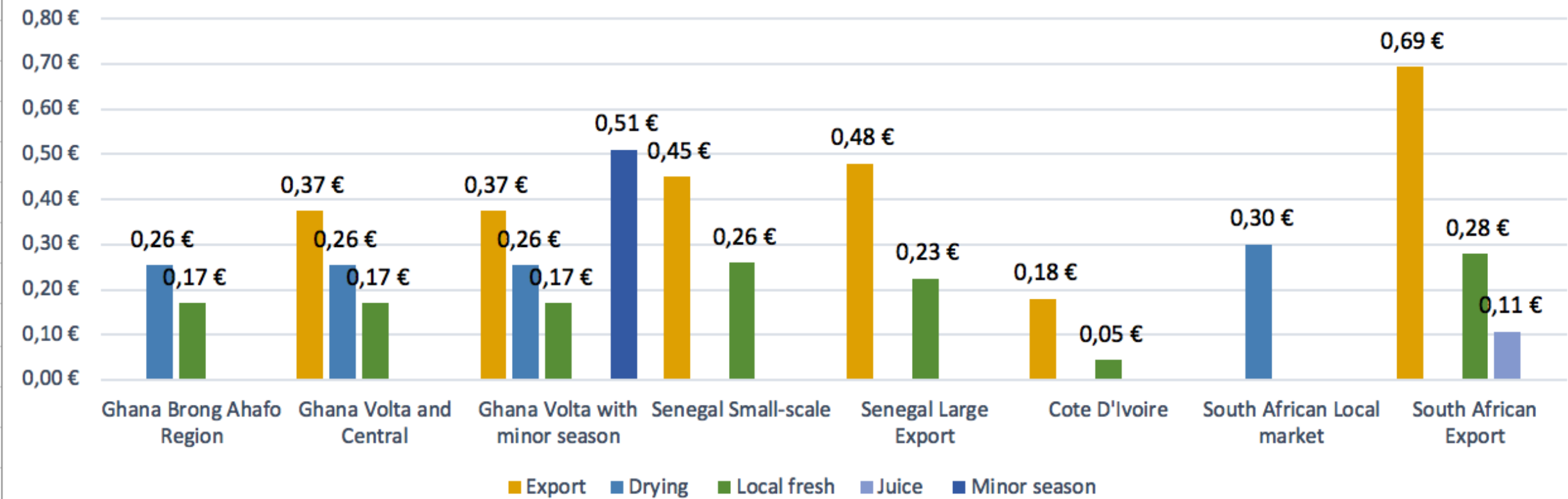
# Yields per ha

Yield in tons/ha build up by grades

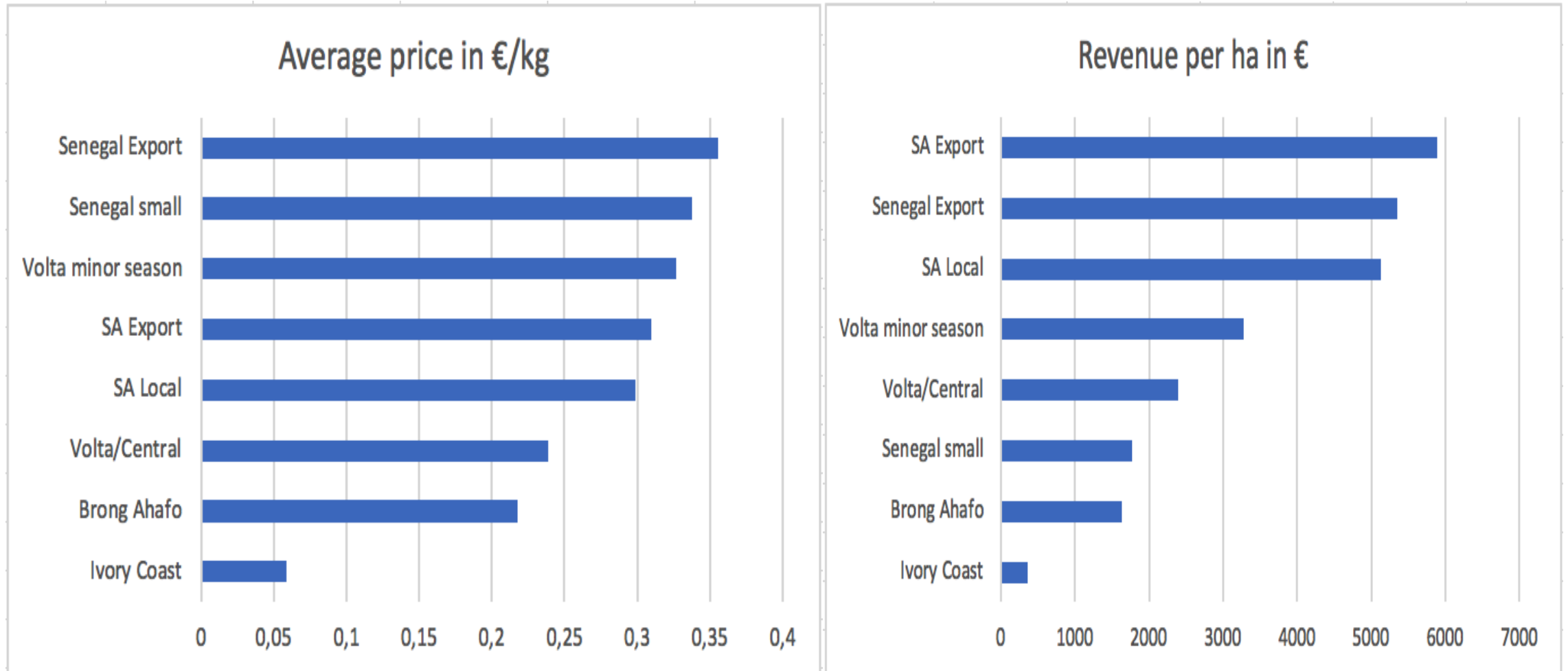


## Sales prices per kg

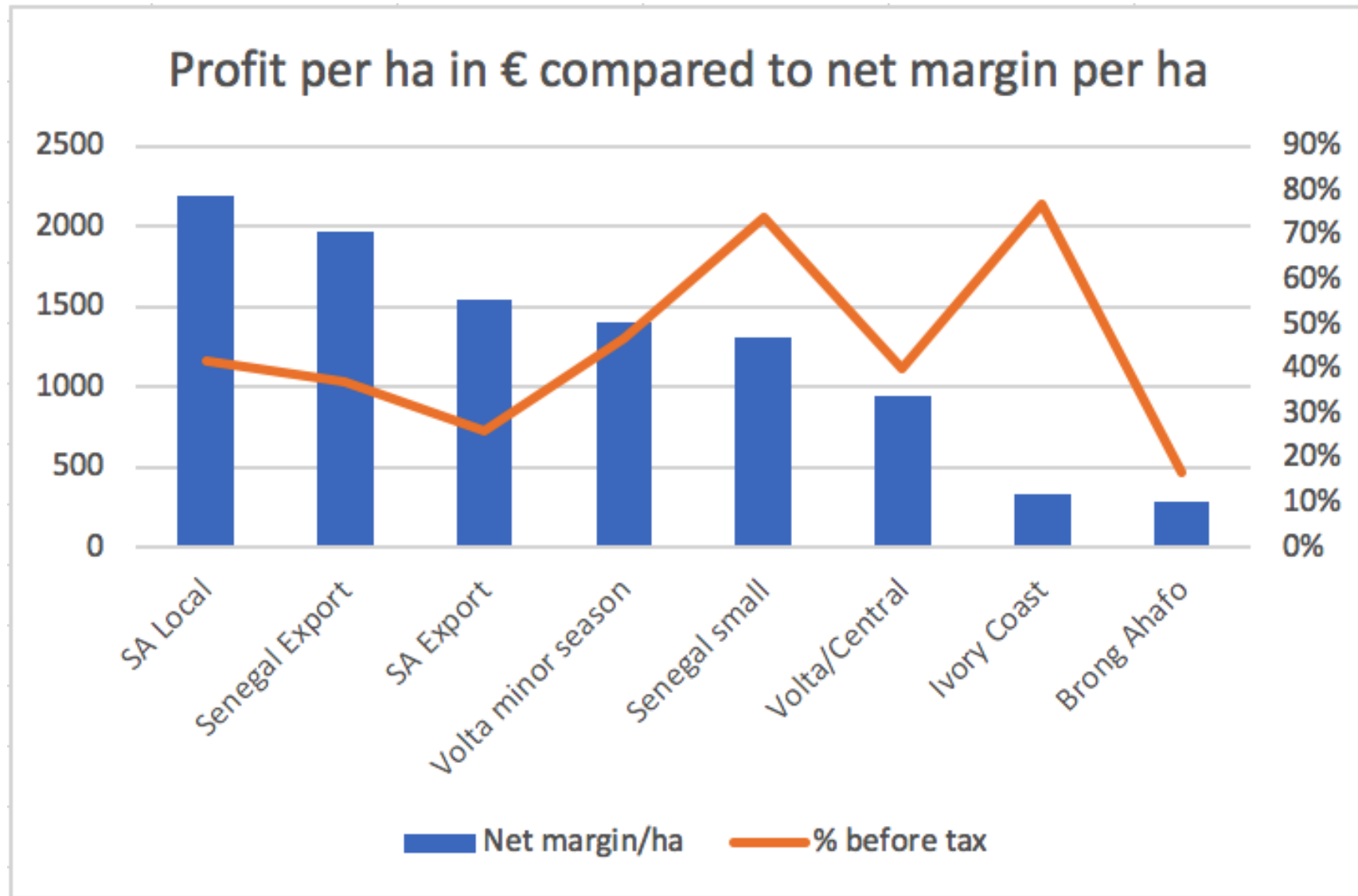
### Comparison of sales prices per grade



# Average price and revenue

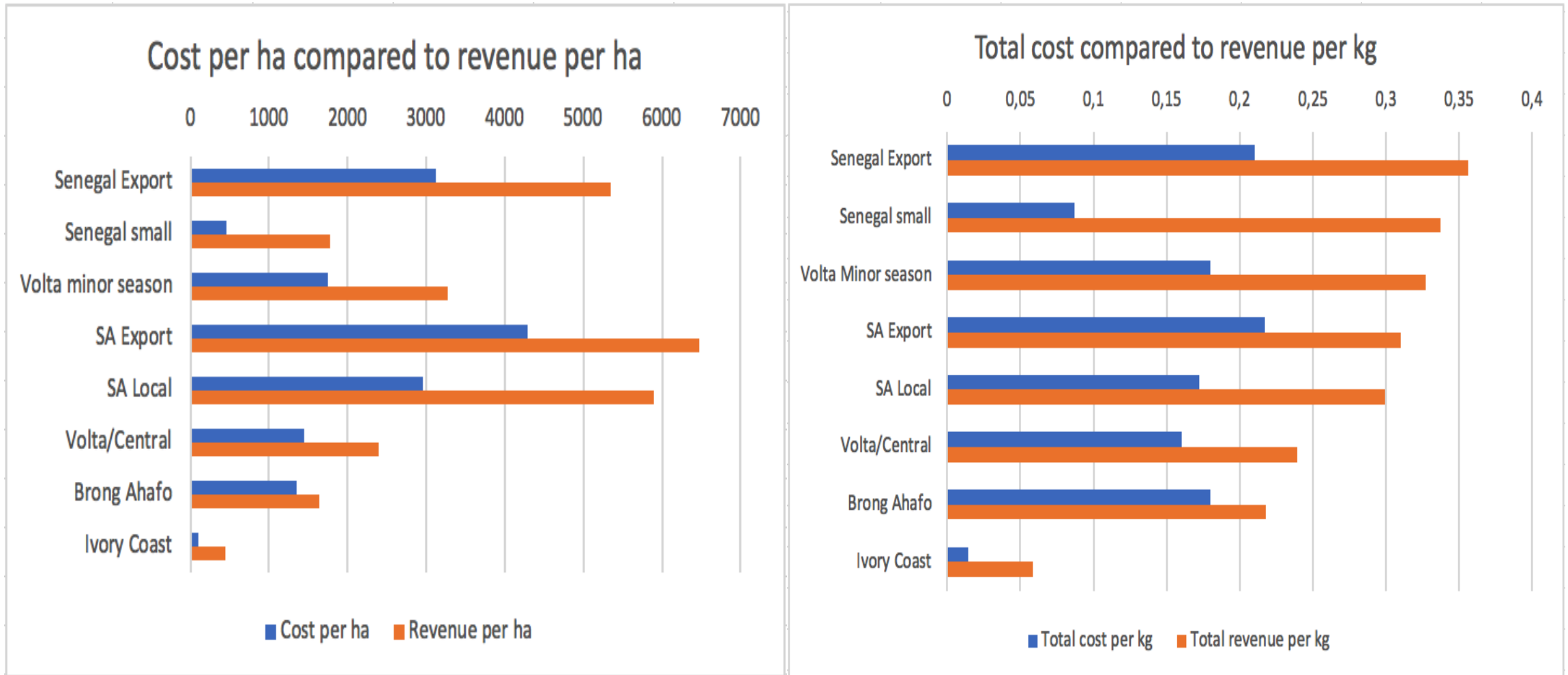


## Profitability per farming system





# Cost and revenue per ha and per kg



## Main conclusion

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Ghana sits in-between extensive systems with low maintenance and highly intensive systems. They make the effort of a highly intensive system but are not getting the yields or revenues

## Conclusions and recommendations

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1. Look into effect of irrigation
2. Can we introduce/ promote Kent? Debunking myths with facts...
3. Find other tropical humid regions that farm mango to see what we can learn
4. Are there other areas better suited to expansion?
5. What has been the experience with high density planting? Can we promote this?
6. Research if there is not too little fertilizer used
7. Understand why so little mango is exported
8. Research if good agricultural practices are carried out in the right way
9. Understand how we can improve marketing of fruit domestically
10. Understand better the potential of minor season
11. Improve quality of trees supplied