SURVEY on SHRIMP POST-LARVAL QUALITY:

ECUADORIAN versus OTHER LATIN-AMERICAN and SOUTH-EAST ASIAN hatcheries

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Wednesday 25th October
10:00 – 10:50

XIX CONGRESO ECUATORIANO DE ACUICULTURA
Tecnologías para una producción sustentable

SHAPING AQUACULTURE TOGETHER
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OVERVIEW

1. Introduction

1.1. What is shrimp post-larval quality (=PL Q)?

1.2. Survey build-up and global distribution

1.3. Data analyses: Ecuador versus other Latin-American countries (=other LA) versus South-East Asia (=SEA)

2. Results

2.1. Hatcheries' characteristics

2.2. Opinions on shrimp PL Q

- 2.2.1. Awareness
- 2.2.2. Determining factors
- 2.2.3. Long term effects
- 2.2.4. Financial implications
- 2.2.5. Disease incidence

2.3. PL Q parameters

- 2.3.1. Monitoring frequency
- 2.3.2. Relevance to estimate PL Q
- 2.3.3. Relevance to predict grow-out (=GO) performance

3. Conclusions

4. Future

1. INTRODUCTION

1.1. What is shrimp PL Q?

the 'readiness' of post-larvae to be stocked in ponds

the physiological condition of shrimp post-larvae, their performance during culture, and resistance to stress tests
(Racotta et al 2003)

No well-defined universally-accepted evaluation method

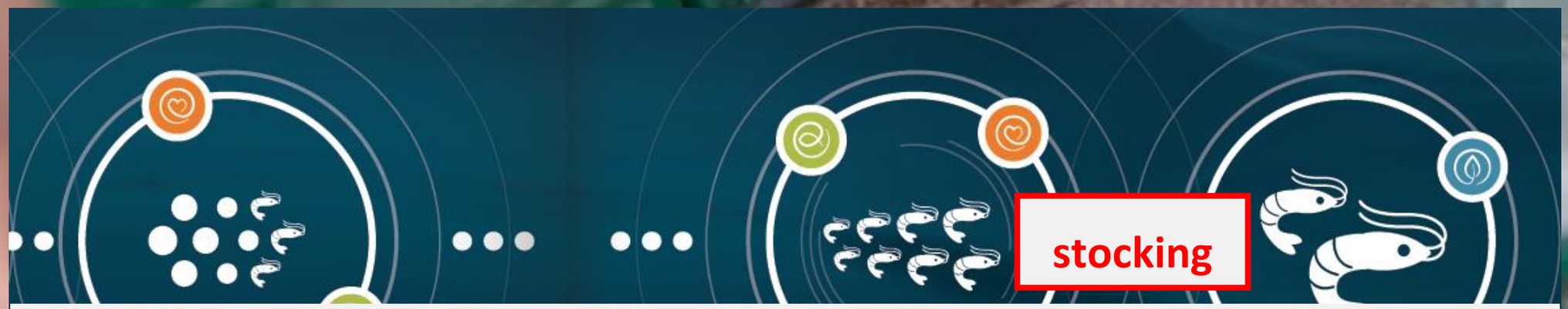
1. INTRODUCTION

1.1. What is shrimp PL Q?

'Inferior post-larvae have played a part in almost 80% of Early Mortality Syndrome occurrence in Malaysia'
(K. Muthusamy in AQUA Culture AsiaPacific, 2013)

'Production and profitability of shrimp farms can be increased by stocking only high quality post-larvae'
(D.E. Jory in Global Aquaculture Alliance, 2017)

'Transition of the hatchery stage from a secondary role into the starring role'
(McIntosh, CPF Thailand – Larvi Conference, 2017)



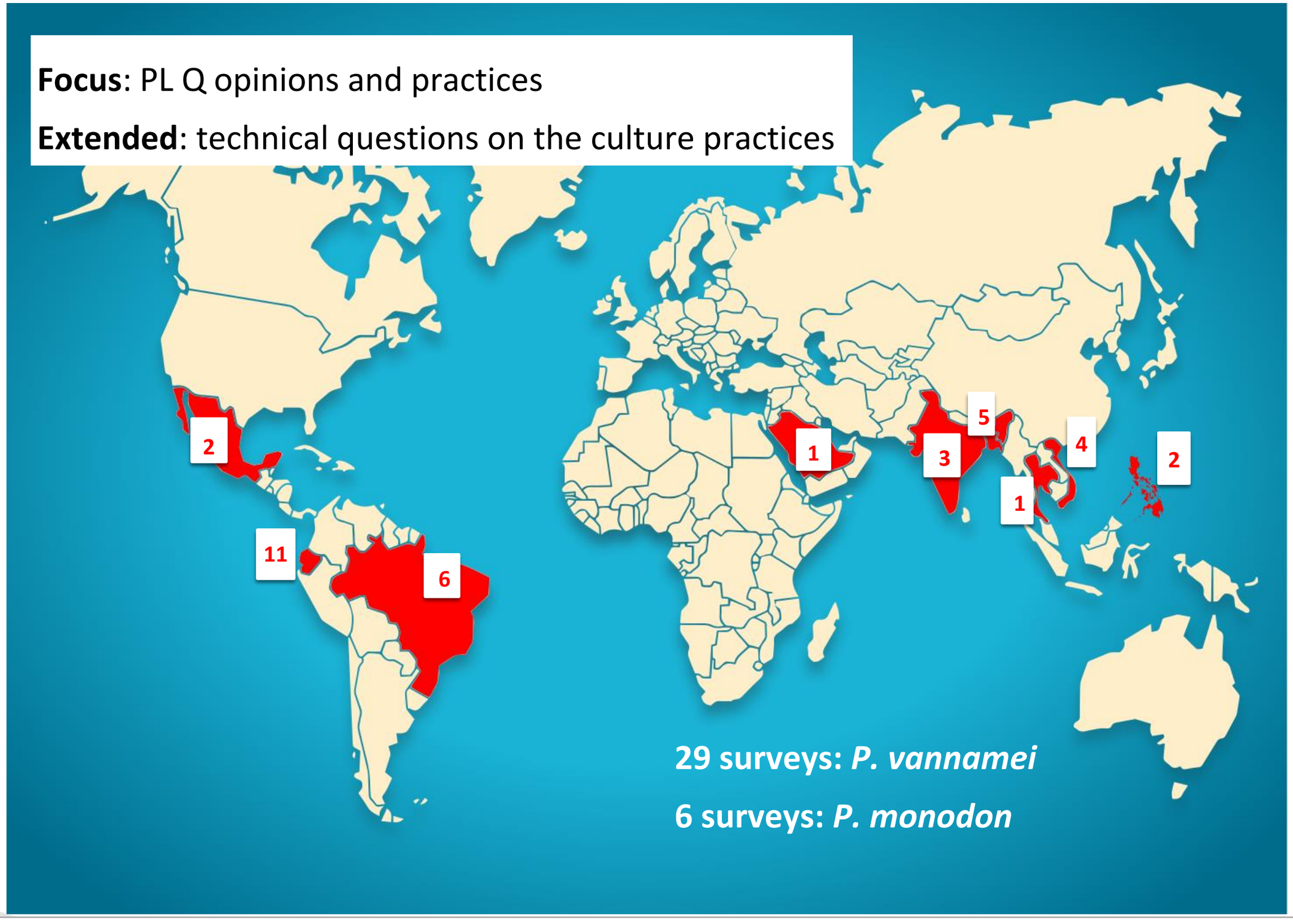
Survey on PL Q opinions and practices
in commercial hatcheries

1. INTRODUCTION

1.2. Survey build-up and global distribution (total 35 surveys)

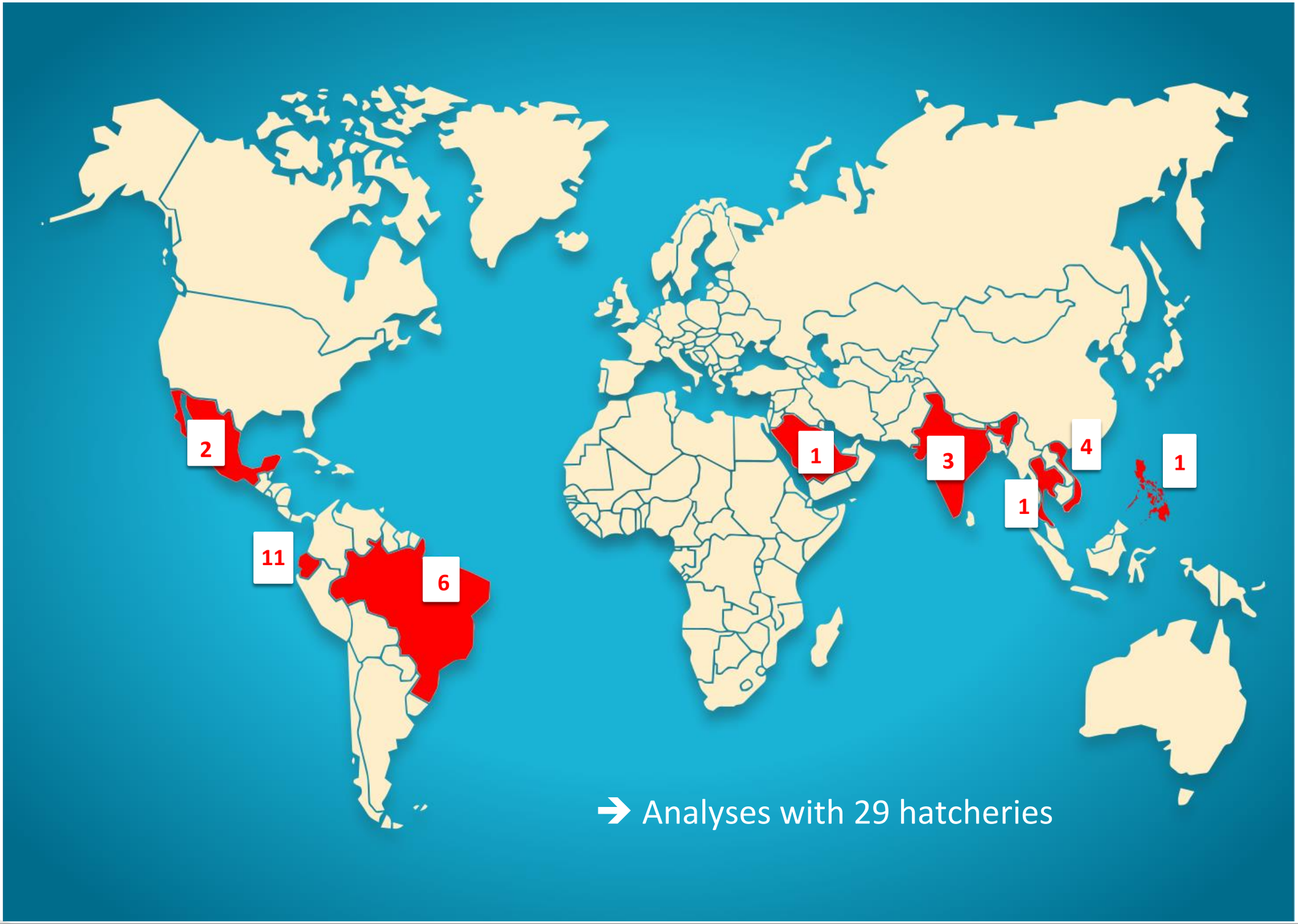
Focus: PL Q opinions and practices

Extended: technical questions on the culture practices



1. INTRODUCTION

1.2. Survey build-up and global distribution - *P. vannamei*



1. INTRODUCTION

1.3. Data analyses: **Ecuador** versus **other LA** versus **SEA**

2. RESULTS

2.1. Hatcheries' characteristics

2. RESULTS

2.1. Hatcheries' characteristics: Ecuador – other LA – SEA

stocking density

	avg nps/ L	min - max range
Ecuador	144	90 - 200
other LA	276	150 - 400
SEA	187	100 - 300

survival at the end of the culture cycle

	avg (%)	min - max range
Ecuador	63	55 - 75
other LA	59	45 - 75
SEA	46	30 - 75

number of days to complete a culture cycle

	avg days	min - max range
Ecuador	22	19 - 25
other LA	21	18 - 23
SEA	20	18 - 25

own live algae production facility

	avg (%)
Ecuador	64
other LA	100
SEA	40

2-phase system in the hatchery phase

	avg (%)
Ecuador	55
other LA	88
SEA	50

2. RESULTS

2.1. Hatcheries' characteristics Ecuador – other LA – SEA

use of feed that color the hepatopancreas

	avg (%)
Ecuador	82
other LA	63
SEA	70

use of specialty feed with health claims*

	avg (%)
Ecuador	45
other LA	100
SEA	20

** High levels of vitamins, immunostimulants*

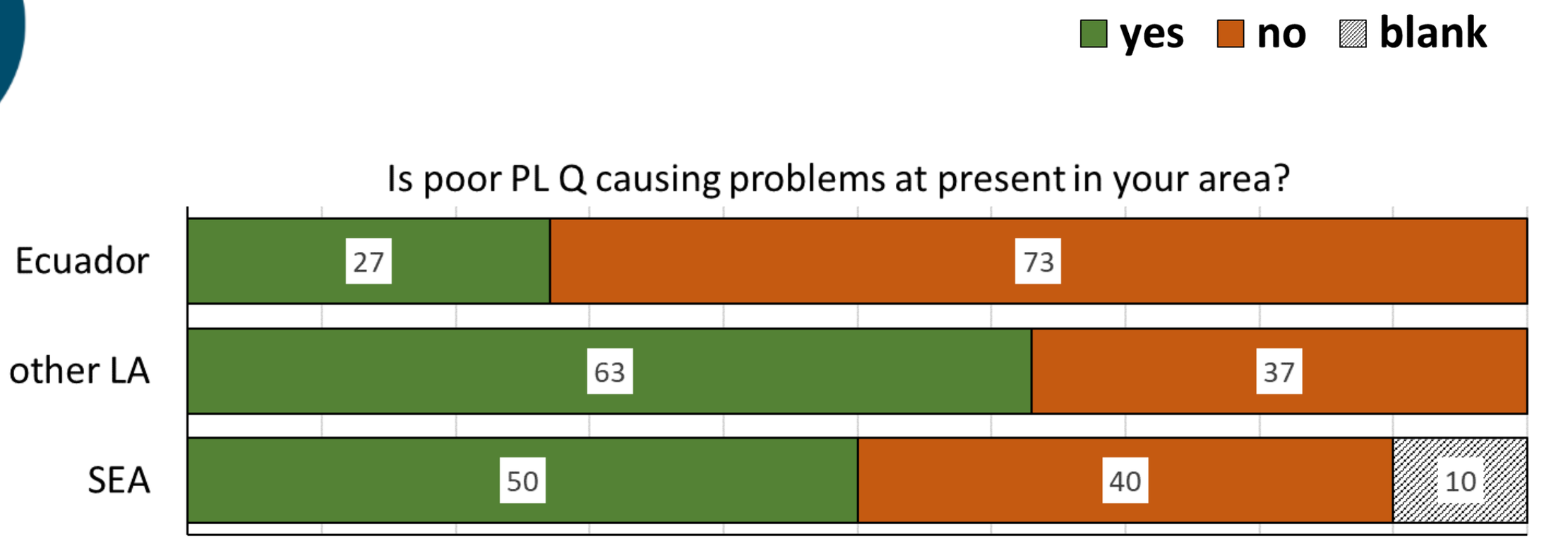
sells <u>only</u> to 3rd party grow-out farms

	avg (%)
Ecuador	45
other LA	50
SEA	30

2. RESULTS

2.2. Opinions on shrimp PL Q

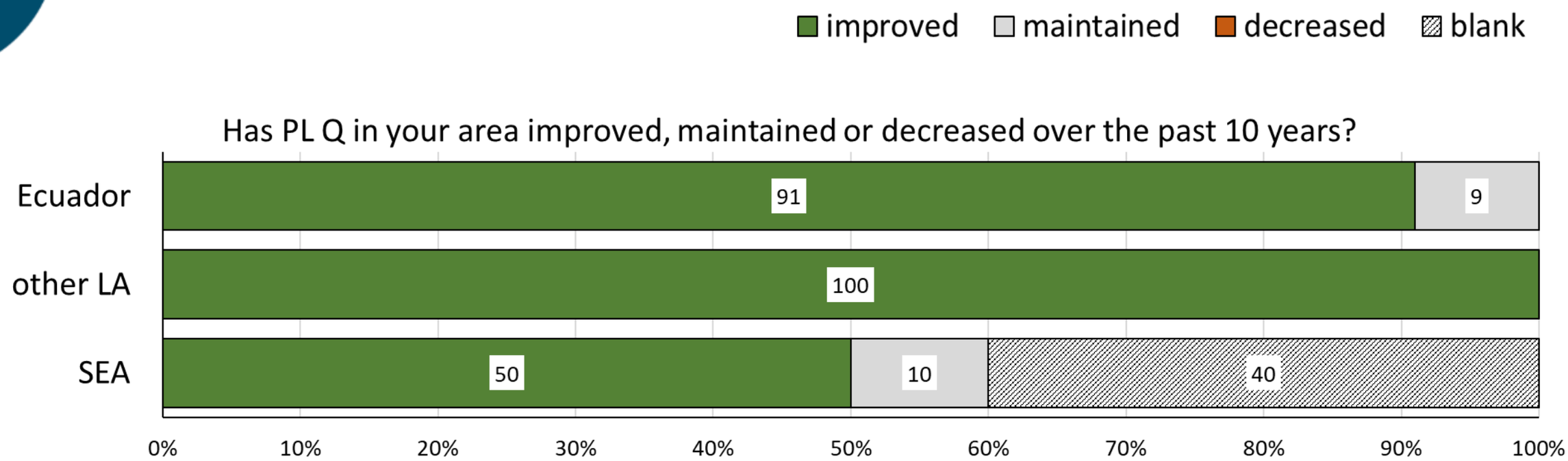
2.2.1. Awareness



What % of screened batches is typically rejected due to PL Q problems?

	avg (%)
Ecuador	5
other LA	2
SEA	7

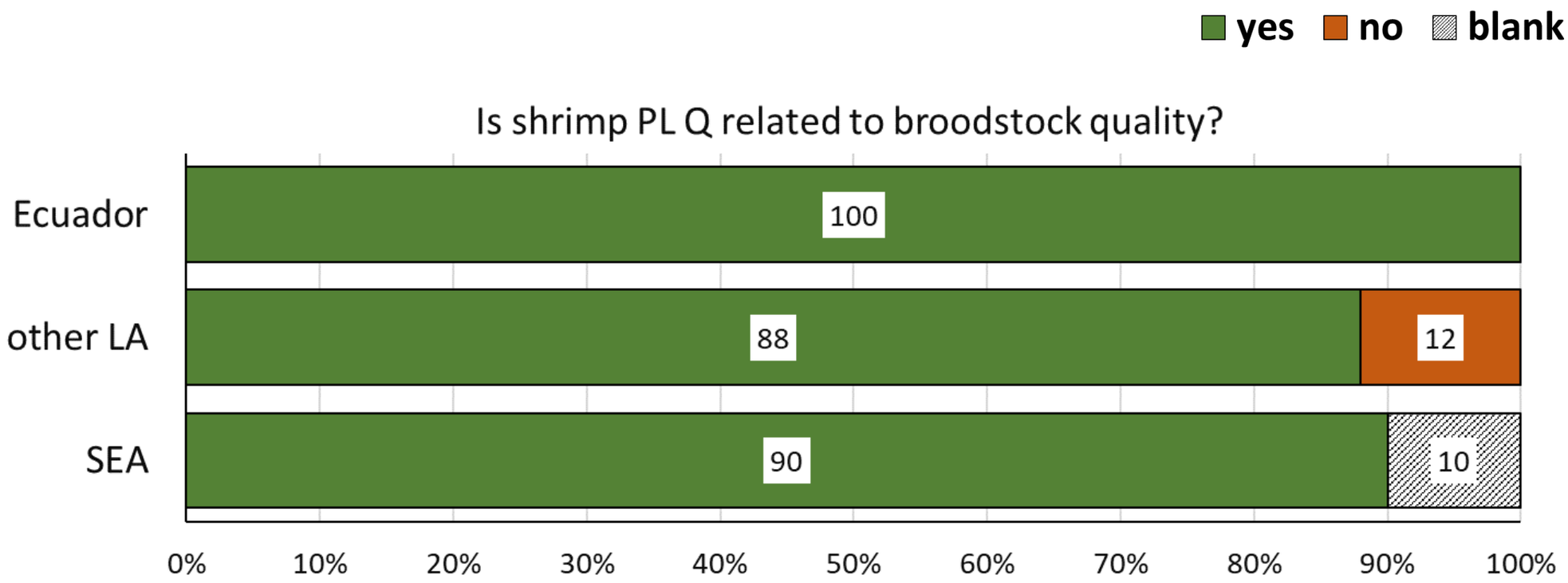
2.2.1. Awareness

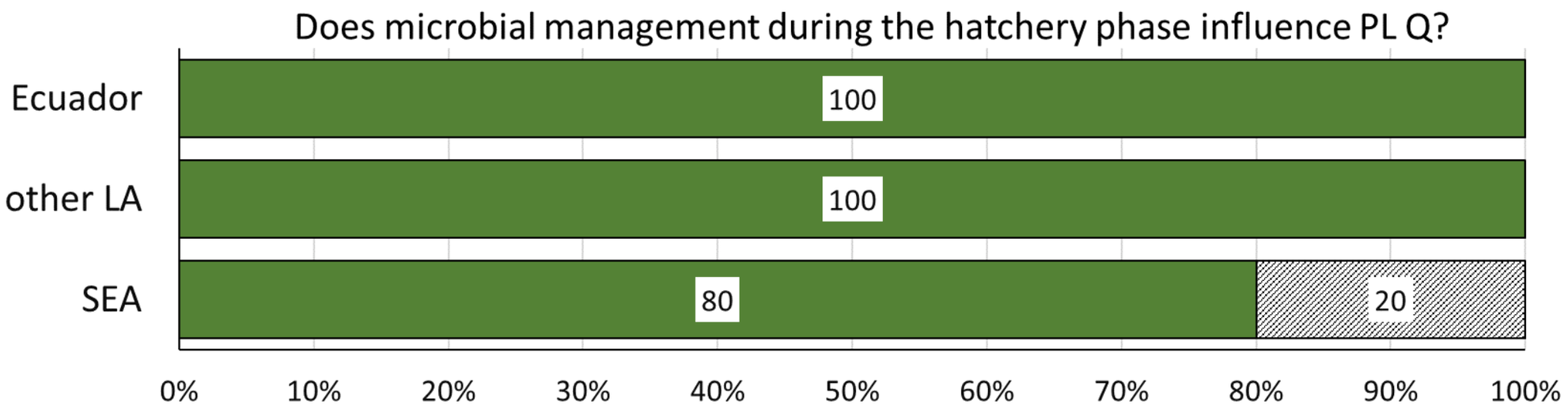


What % of the PL dies shortly after transfer from hatchery/ nursery to ponds?

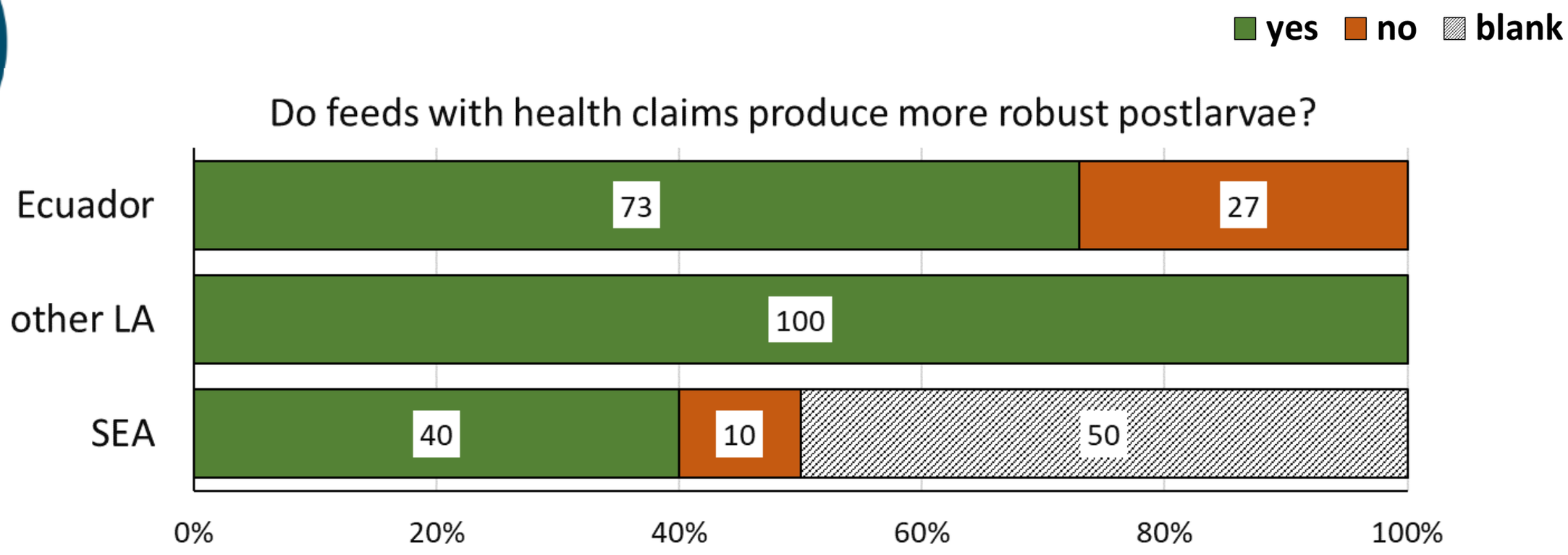
	avg (%)	min - max range
Ecuador	11	5 - 20
other LA	3	0 - 10
SEA	7	3 - 10

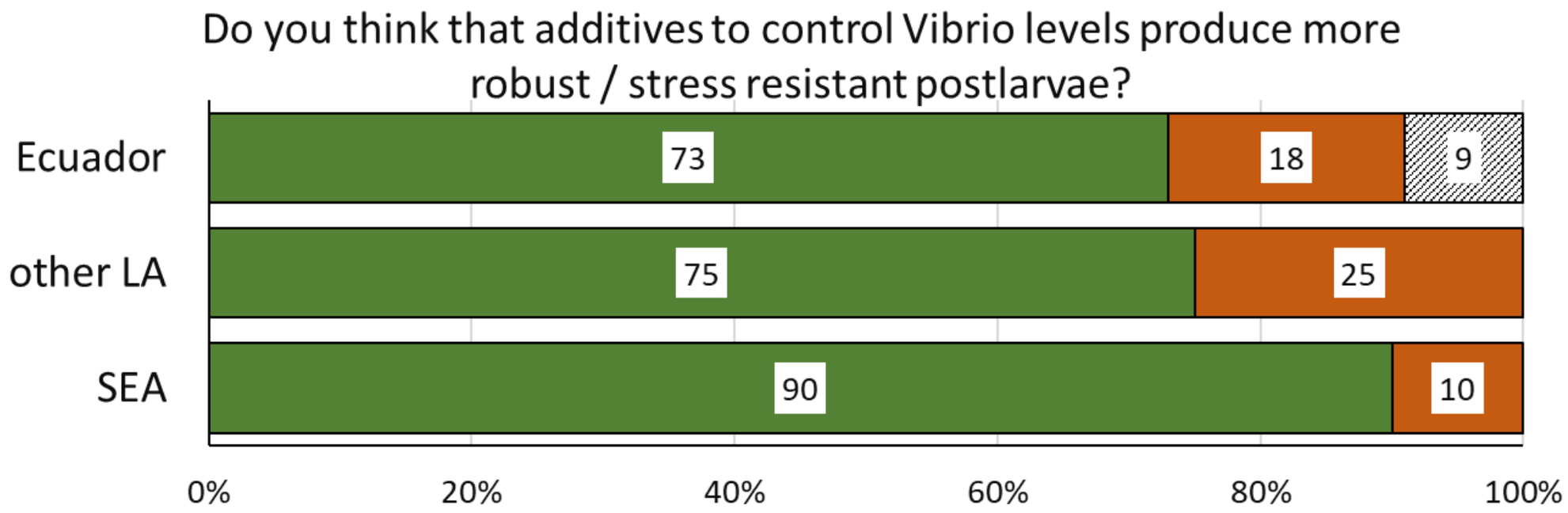
2.2.2. Determining factors





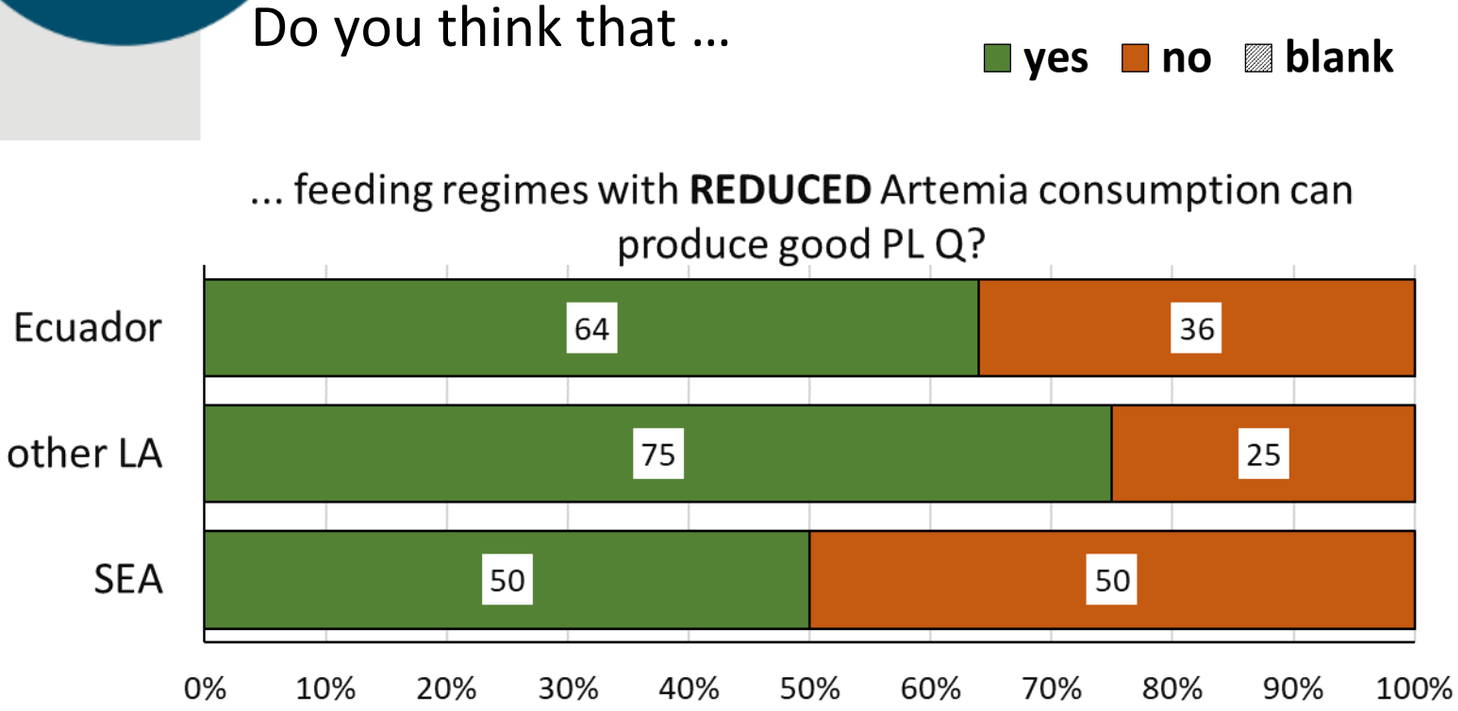
2.2.2. Determining factors

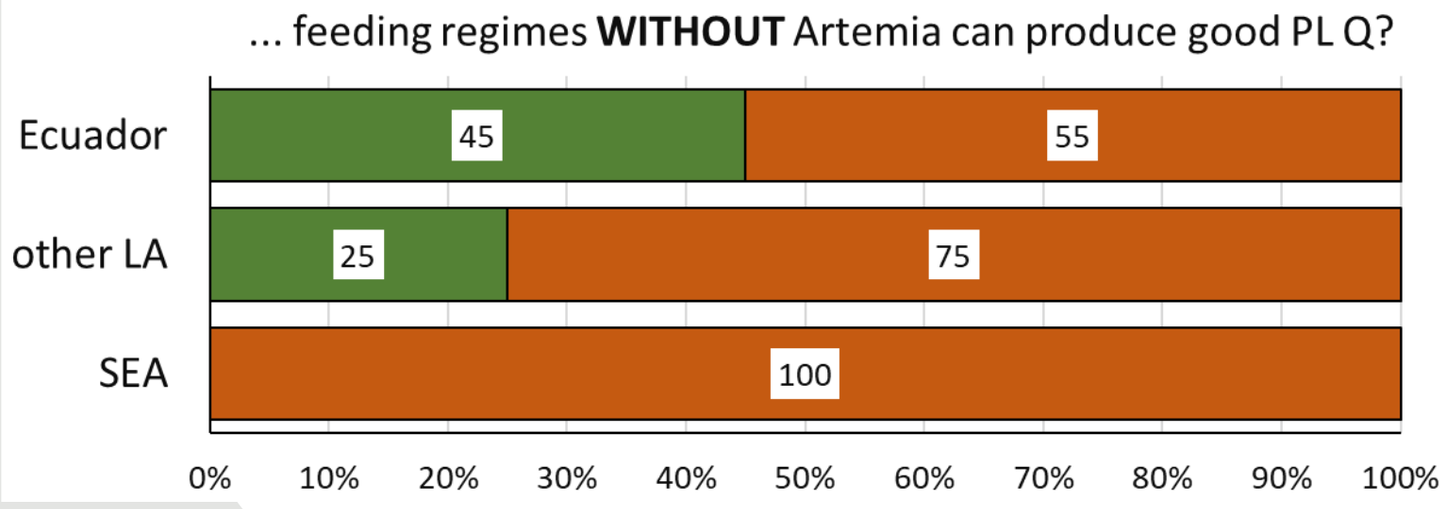




2.2.2. Determining factors

Do you think that …



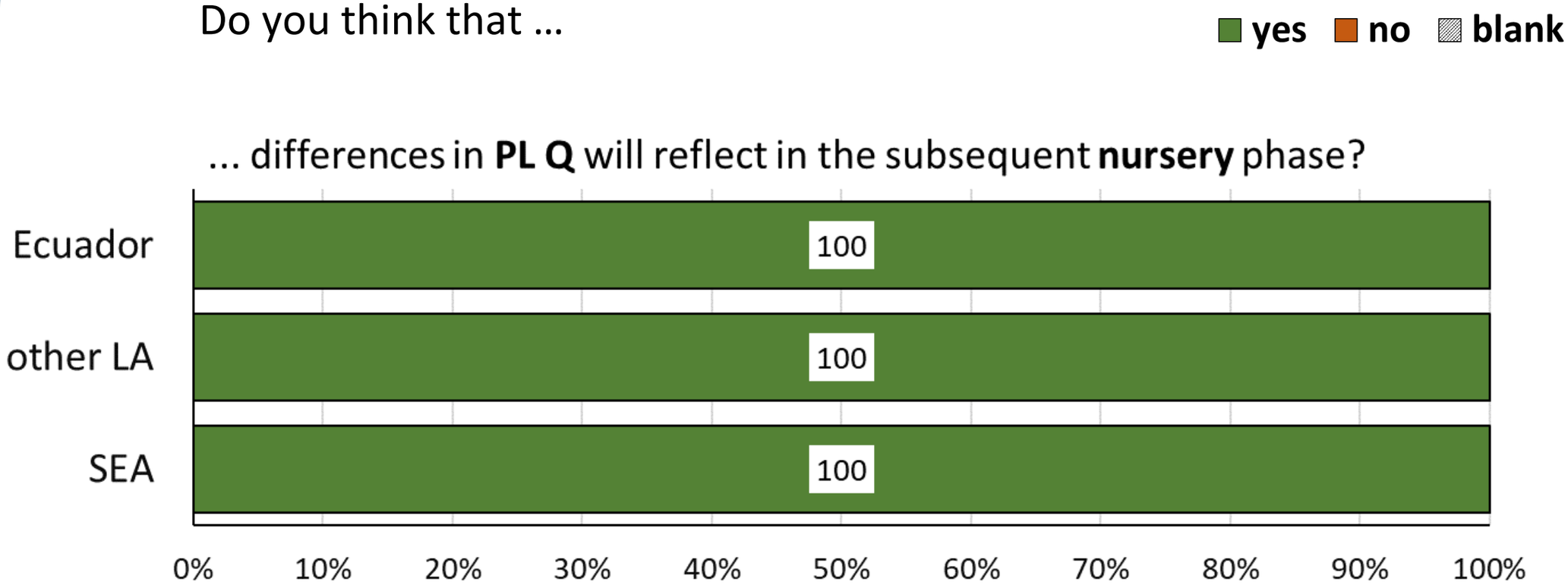


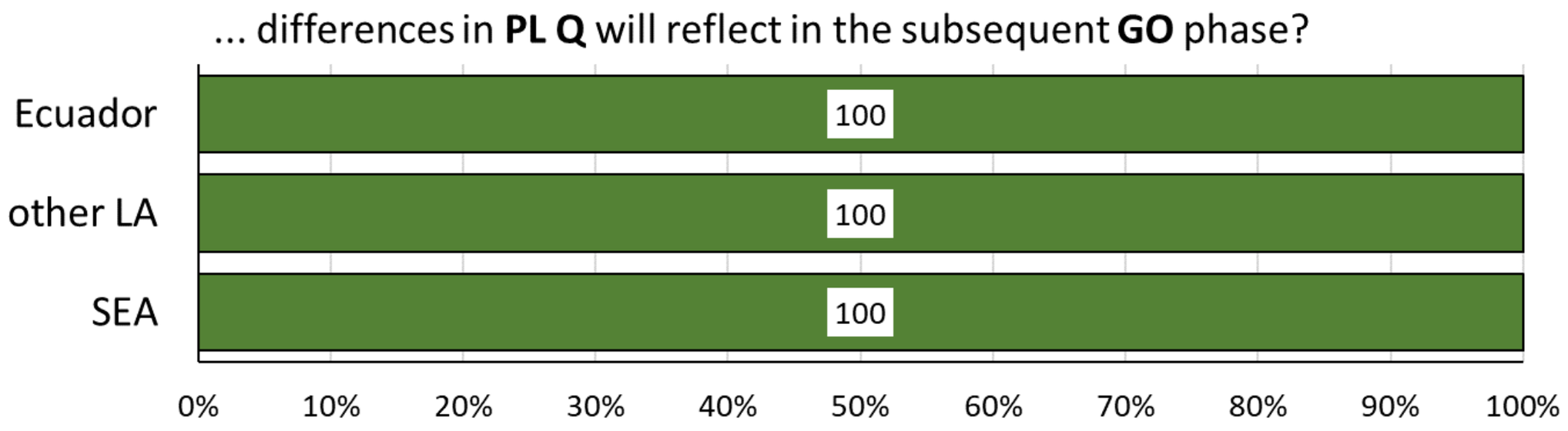
smallest tanks %	rectangular	
	flat bottom	U/V shaped
Ecuador	-	**91**
other LA	13	**75**
SEA	**40**	30

largest tanks %	rectangular	
	flat bottom	U/V shaped
Ecuador	18	**64**
other LA	25	**38**
SEA	**40**	-

2.2.3. Long term effects

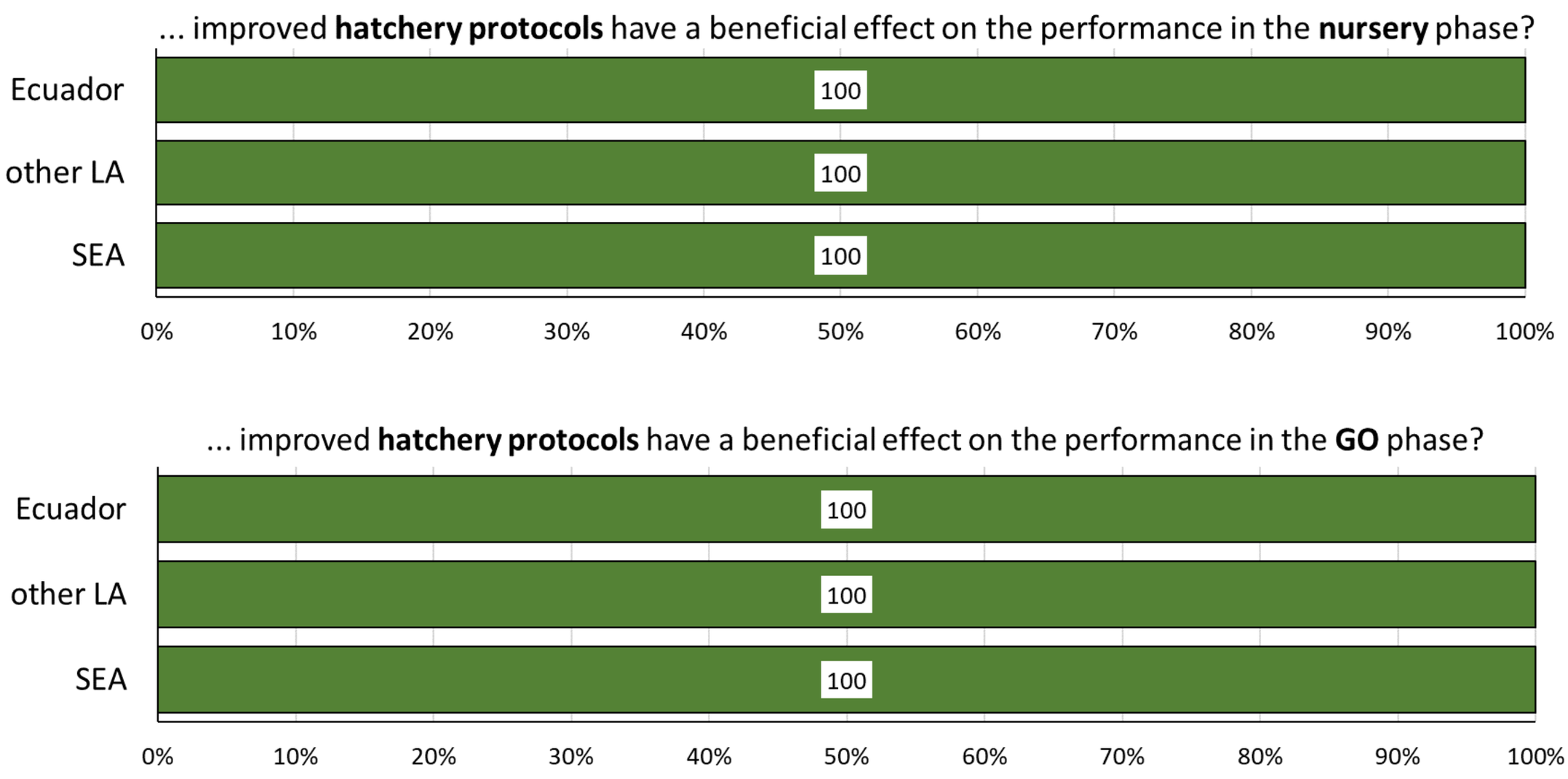
Do you think that …



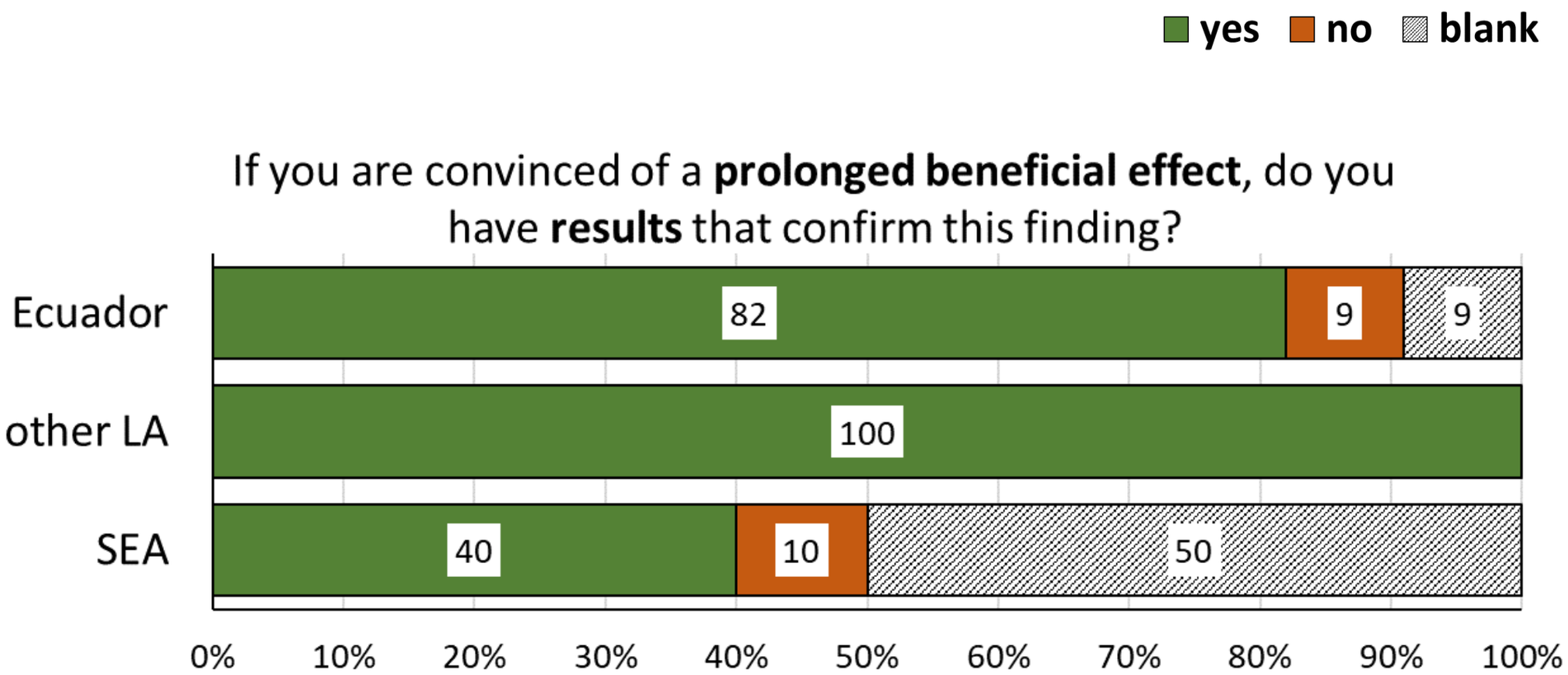


2.2.3. Long term effects

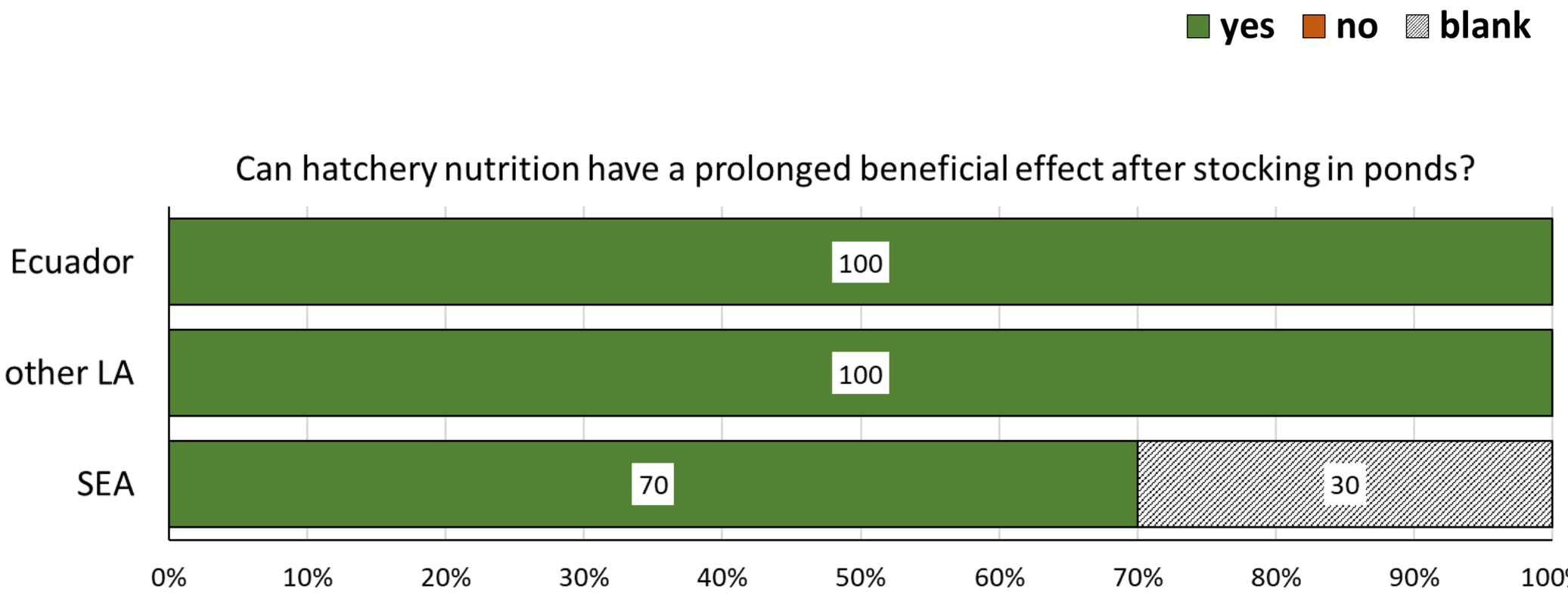
Do you think that …

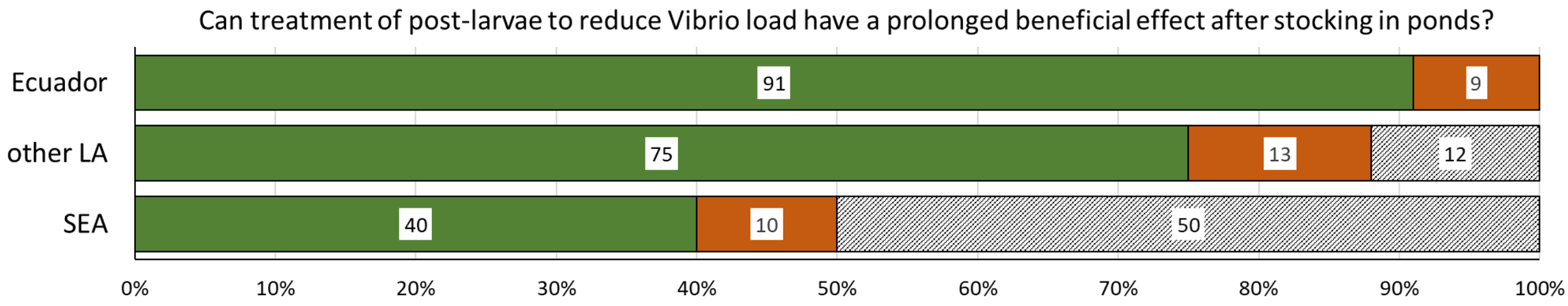


2.2.3. Long term effects



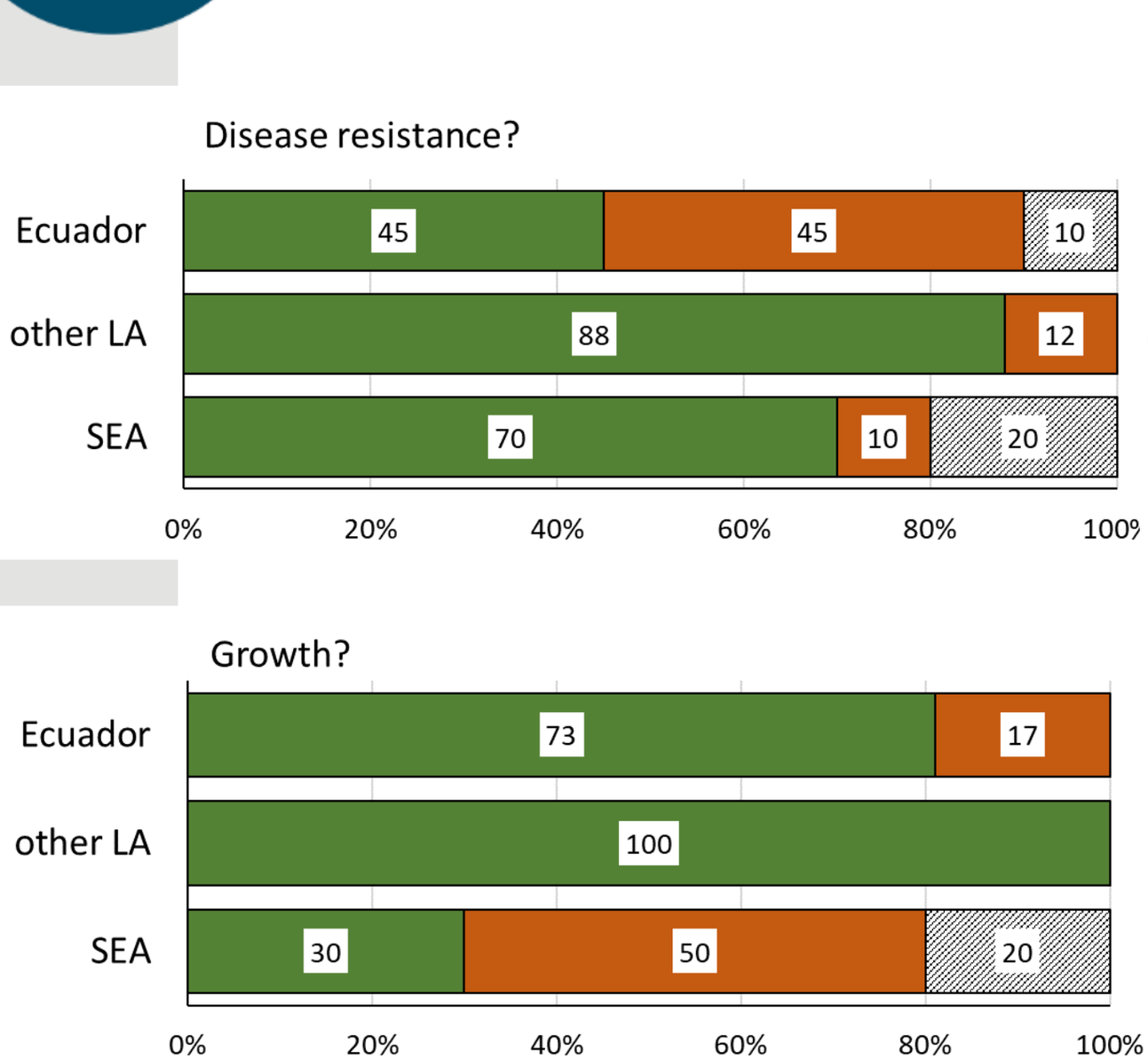
2.2.3. Long term effects

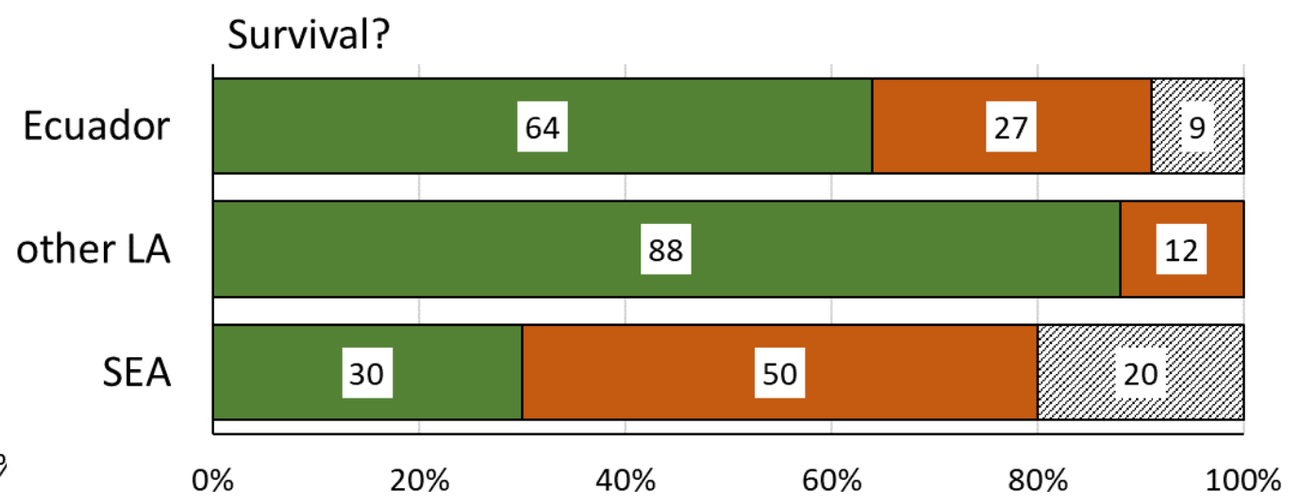


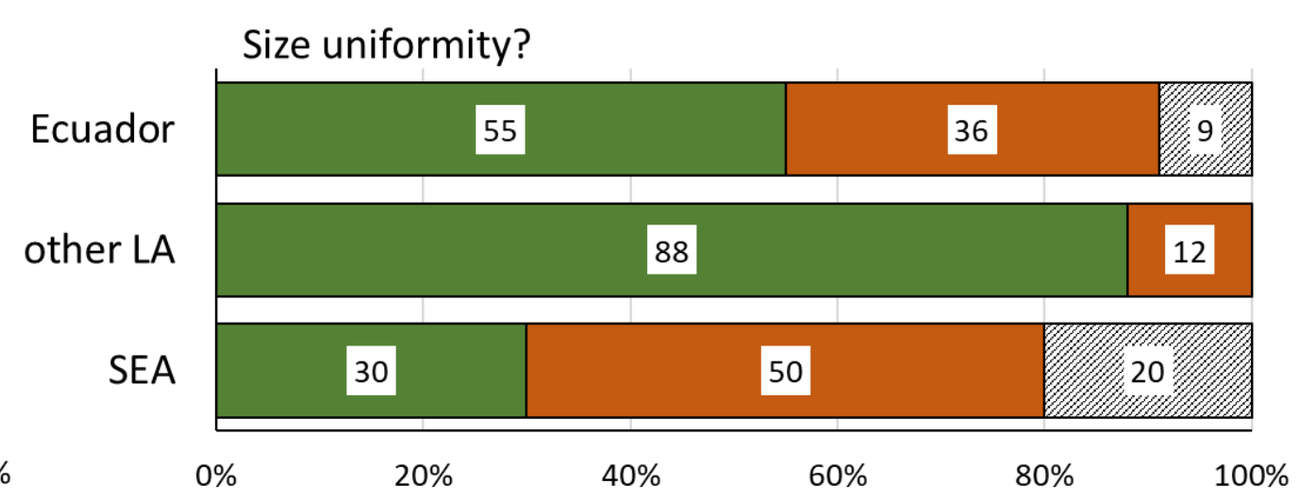


2.2.3. Long term effects

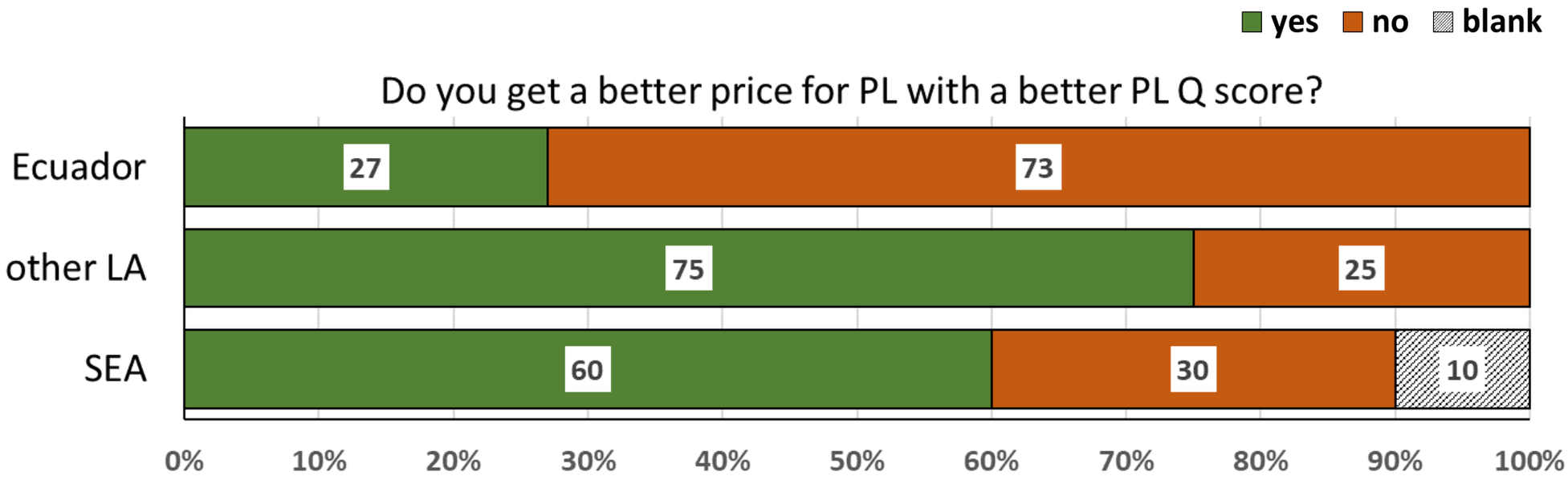
Which parameter do you think will be most affected by hatchery protocols:





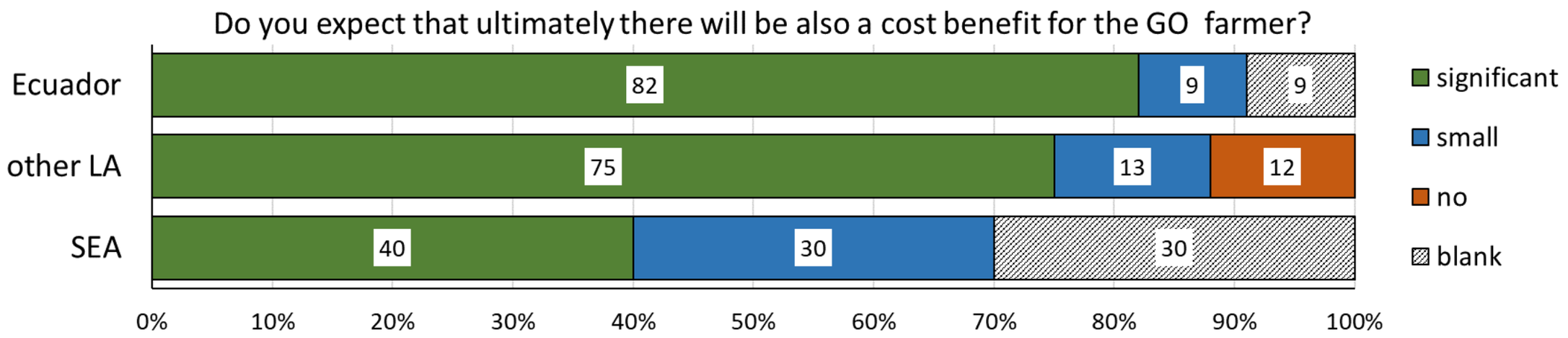


2.2.4. Financial implications

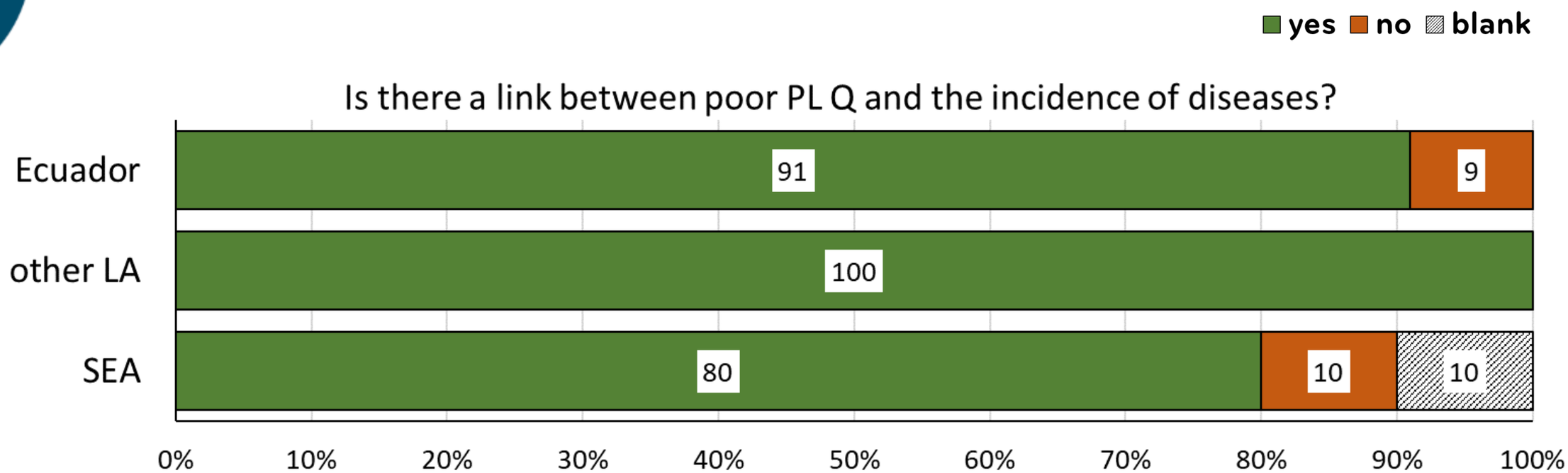


If yes, can you give an indication of how much the price gets (increase in %)?

	avg (%)	min-max range
Ecuador	10	5 - 15
other LA	19	4 - 41
SEA	15	5 - 30



2.2.5. Disease incidence



What % of the screened batches is typically rejected due to disease problems?

	avg (%)	min - max range
Ecuador	3	0 - 10
other LA	2	0 - 10
SEA	9	0 - 20

2. RESULTS

2.3. PL Q parameters

2.3. PL Q parameters (29)

Hatchery

survival
larval development speed
PL count per gram wet weight
PL size (length)
PL stage (age)
nutritional history

Visual

color HP
animal color
size variation (by eye)

Behavioral

swimming activity
feeding activity

Microscopical

lipid globules in HP
gill ramification
gut fulness
rostral counts
deformities, necrosis, fouling
molting (recent or not)
gut: muscle ratio
uropods
chromatophores

(stress) tests

osmotic stress test
toxicity stress test
bacterial challenge test
counter current test

Analysis

total plate count (marine agar)
Vibrio count (TCBS or other)
screening for a pathogenic virus
biochemical analyses (lipid, glucose)

Index

multifactorial assessment

2.3. PL Q parameters

1) How frequent do you monitor …?

never – occasionally – always

➔ **avg monitoring score**

2) How important is the parameter to estimate PL Q?

not important – low – moderate – highest importance

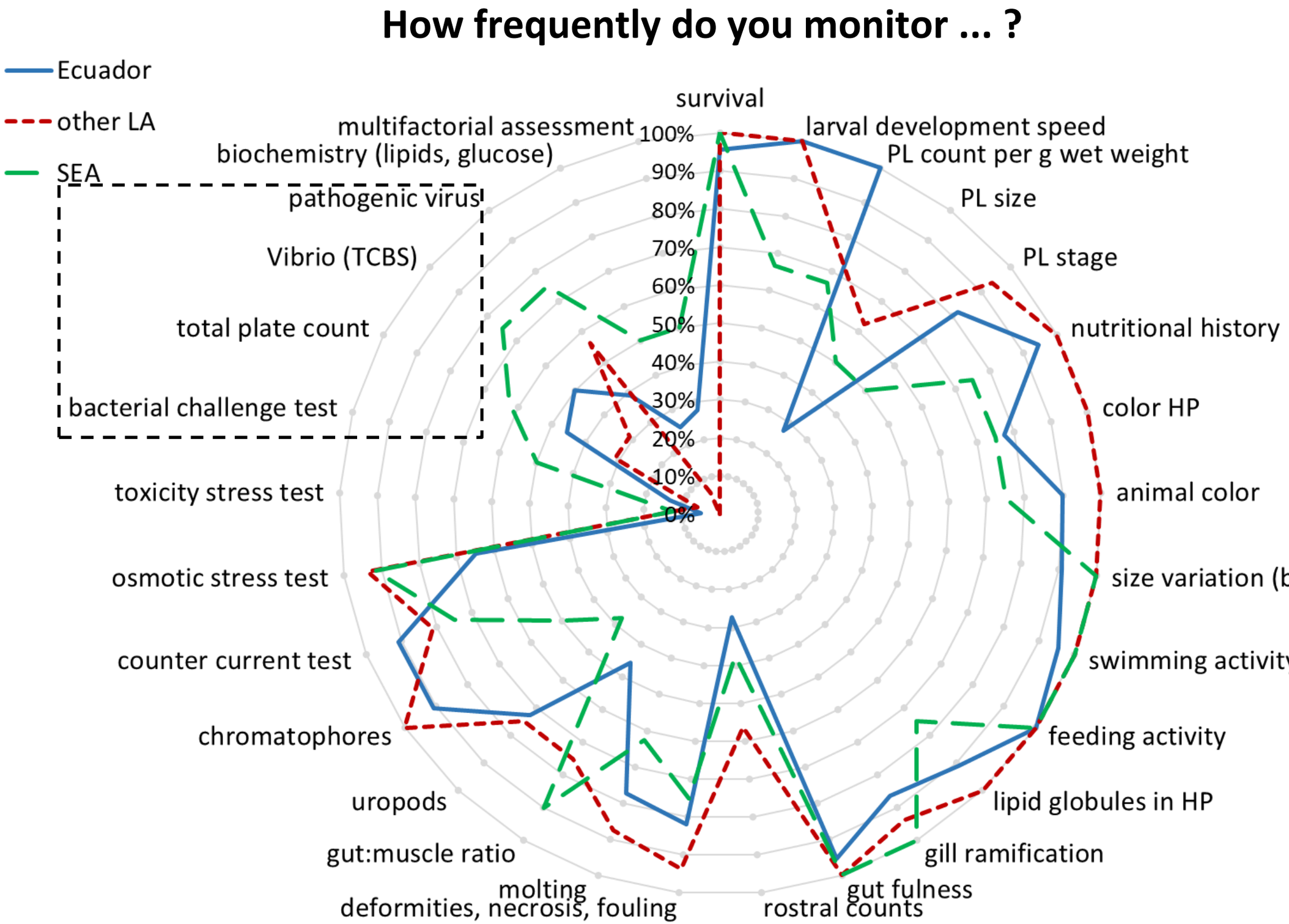
➔ **avg score for estimating PL Q**

3) How important is this parameter to predict performance in GO?

not important – low – moderate – highest importance

➔ **avg score for predicting GO performance**

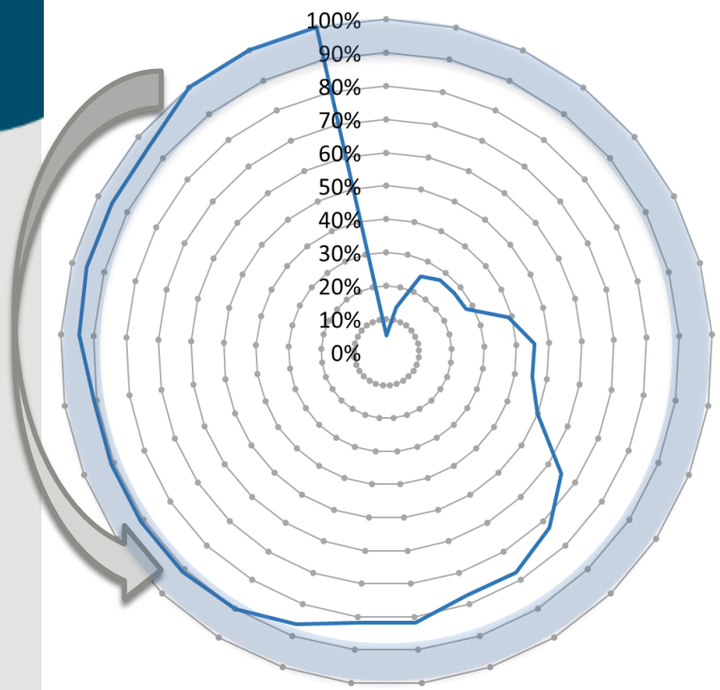
2.3.1. **MONITORING** – importance PL Q – importance GO performance



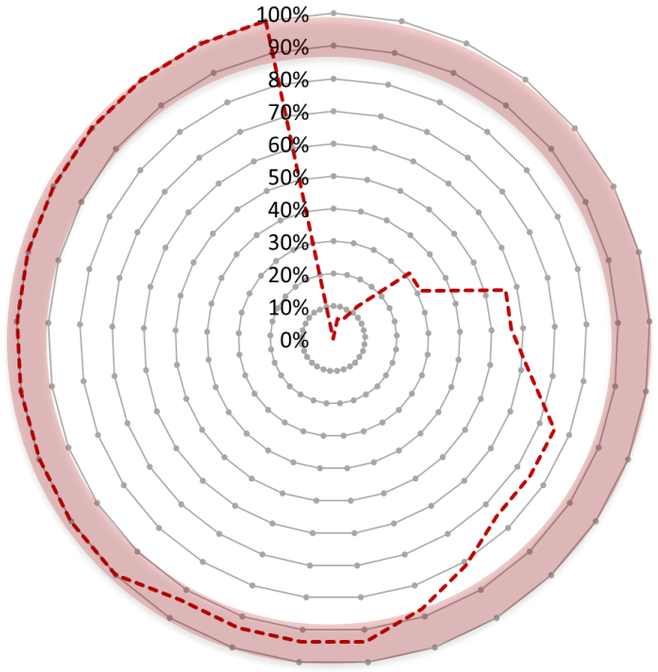
2.3.1. **MONITORING** – importance PL Q – importance GO performance

➔ most frequently monitored parameters (score ≥ 90%)

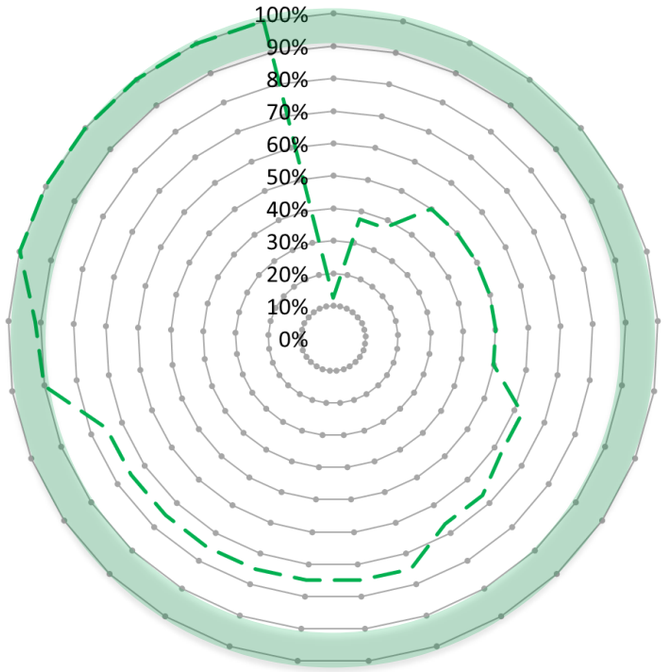
Ecuador



other LA



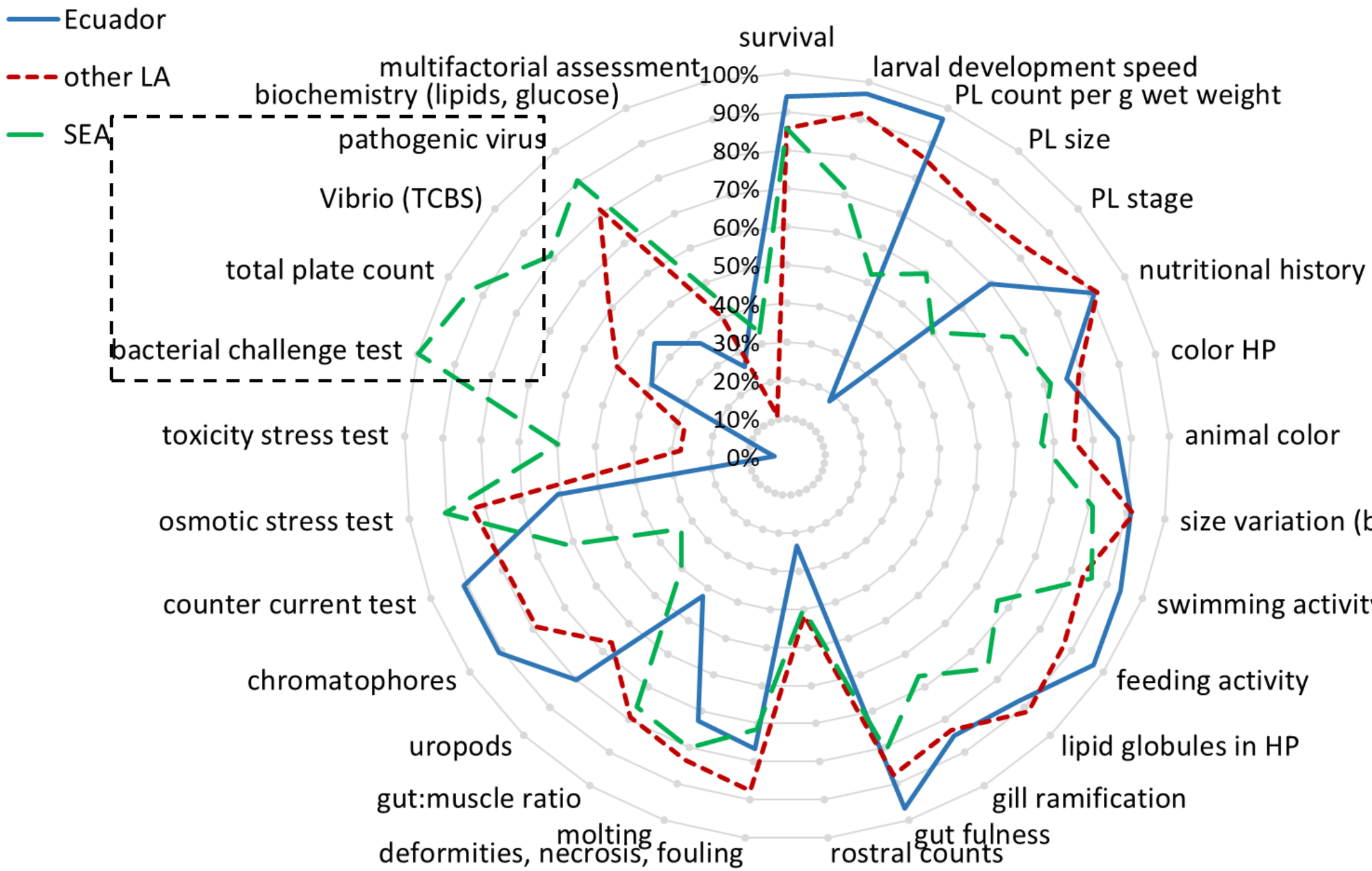
SEA



- counter current test
- PL count per g wet weight
- PL stage
- deformities, necrosis, fouling
- color of HP
- gut:muscle ratio
- lipid globules in HP
- nutritional history
- larval development
- chromatophores
- animal color
- osmotic stress test
- gill ramification
- survival
- size variation (by eye)
- swimming activity
- gut fulness
- feeding activity

2.3.2. monitoring – **IMPORTANCE PL Q** – importance GO performance

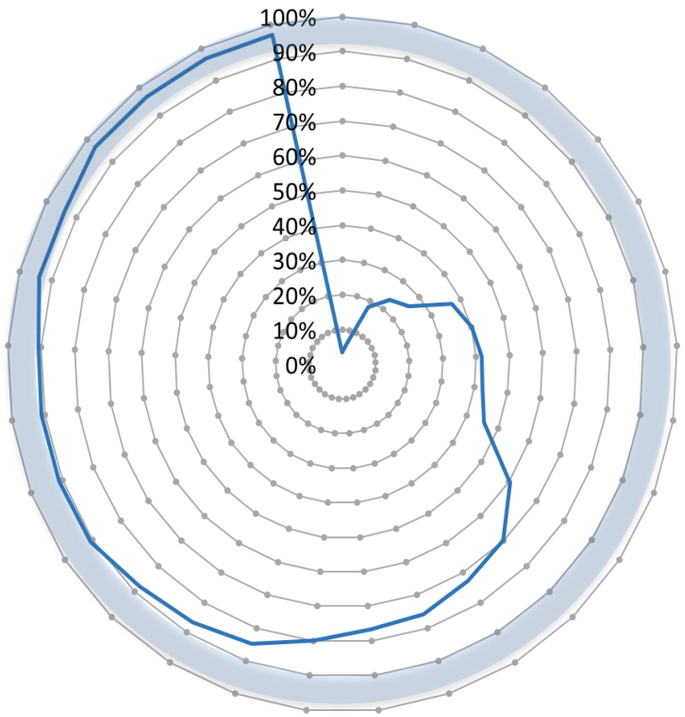
How important is the parameter to estimate PL Q?



2.3.2. monitoring – **IMPORTANCE PL Q** – importance GO performance

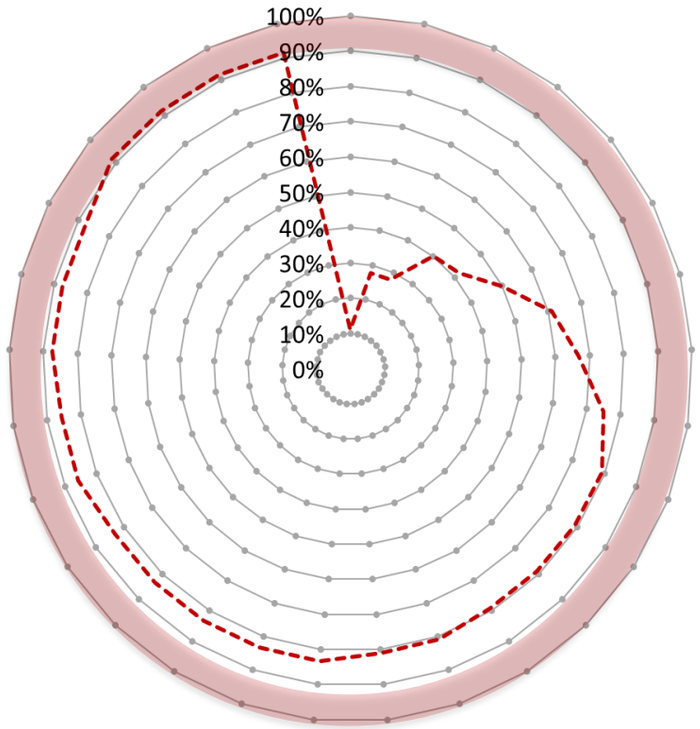
➔ most important parameters to estimate PL Q (score ≥ 90%)

Ecuador



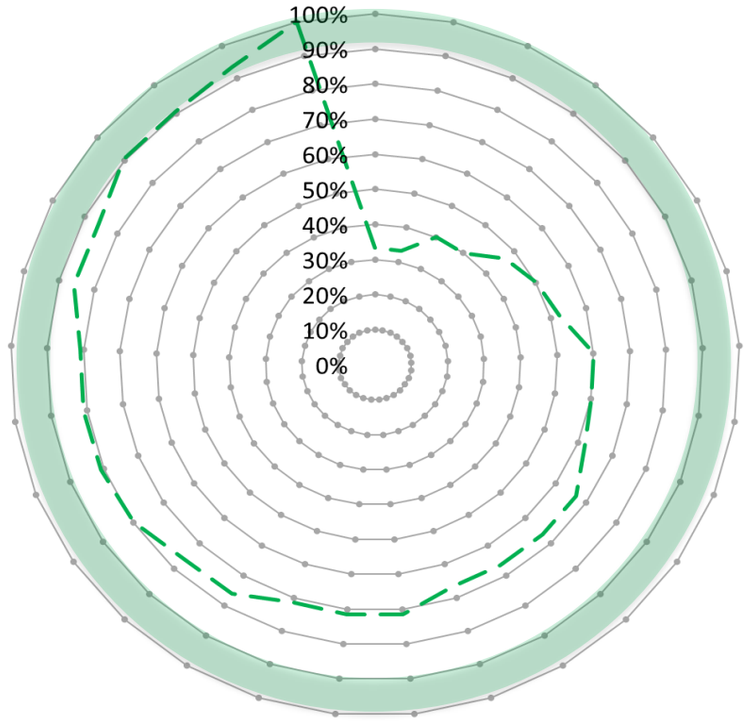
chromatophores
counter current test
survival
swimming activity
feeding activity
gut fulness
PL count per g wet weight

other LA



lipid globules in HP

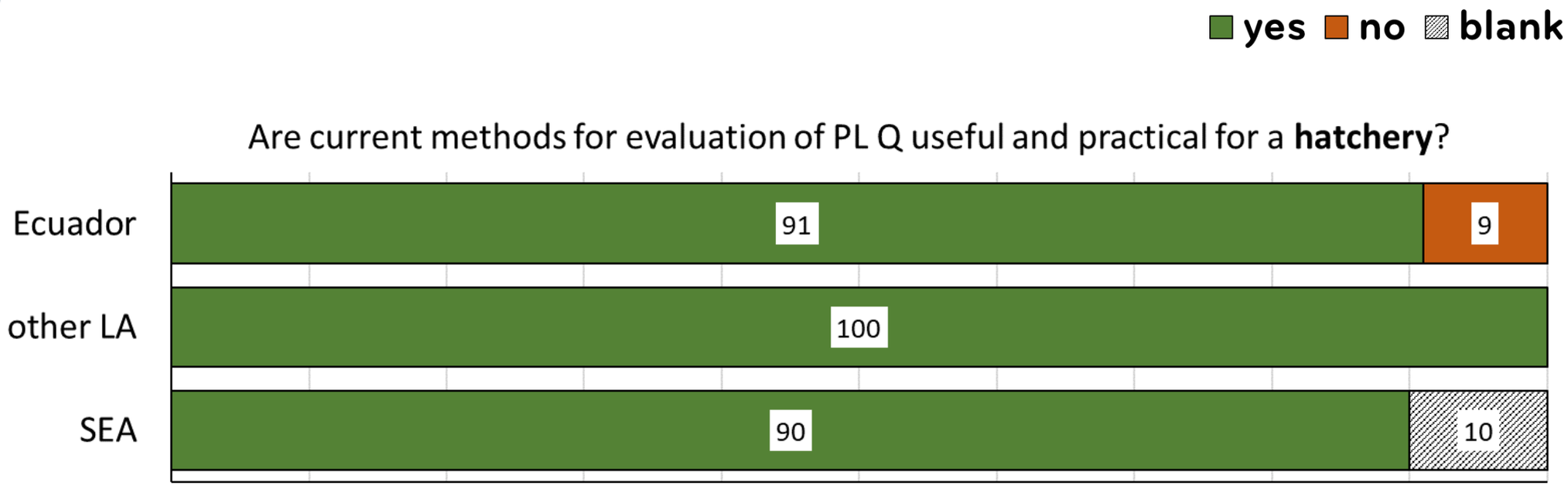
SEA

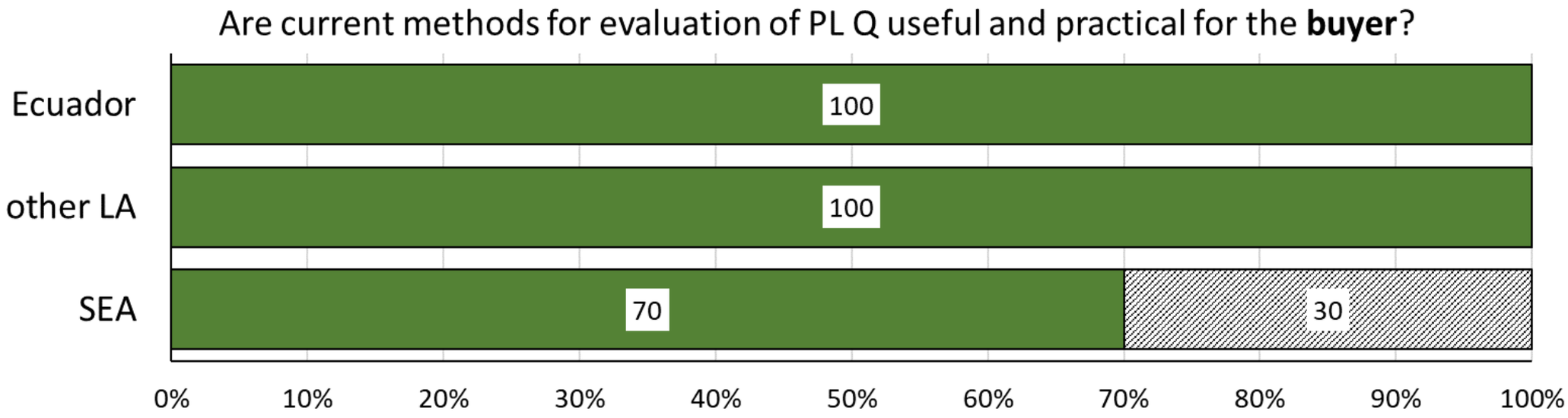


osmotic stress test
pathogenic virus
total plate count (marine agar)
bacterial challenge test

larval development speed
nutritional history
size variation (by eye)

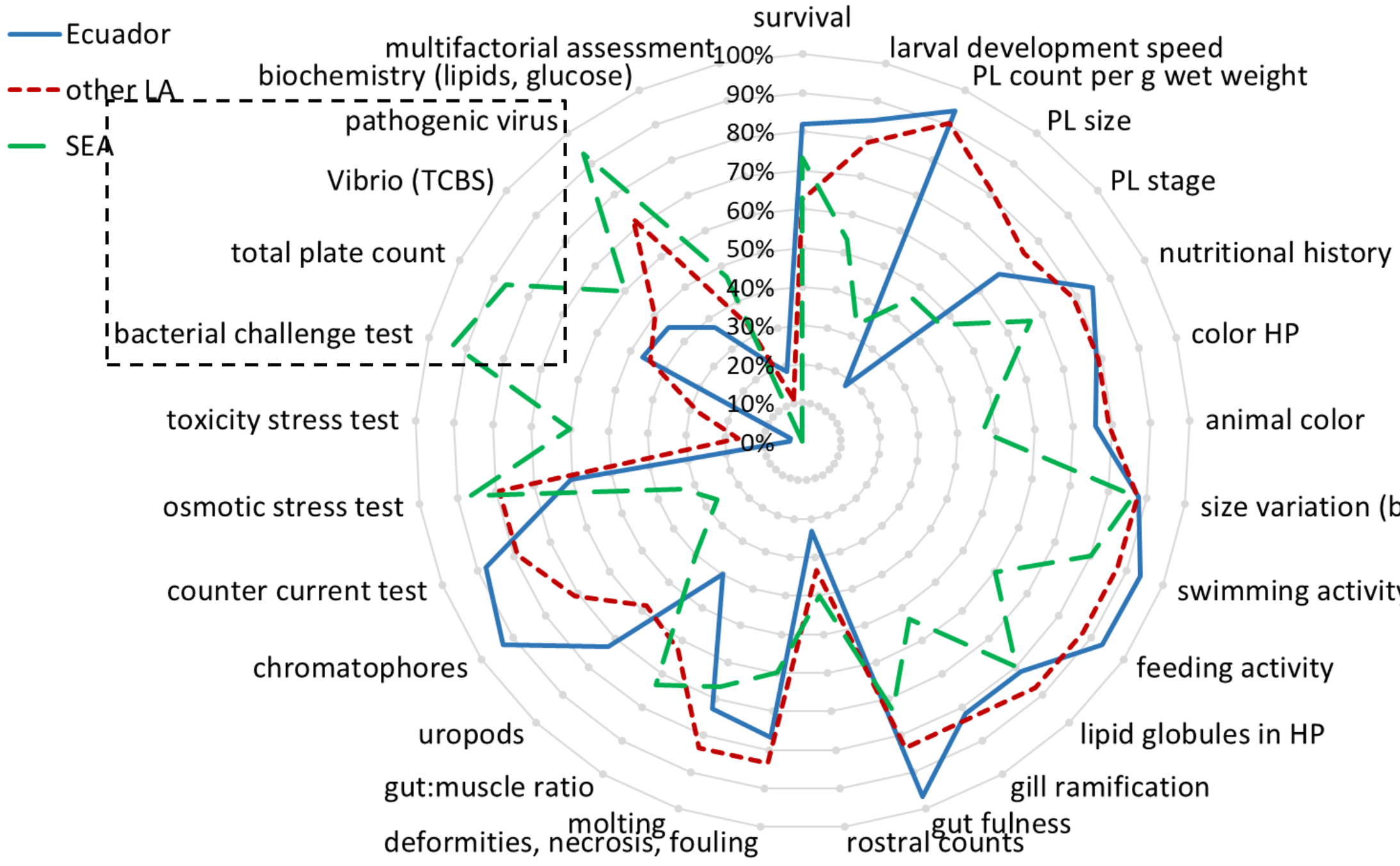
2.3.2. monitoring – **IMPORTANCE PL Q** – importance GO performance





2.3.3. monitoring – importance PL Q – **IMPORTANCE GO PERFORMANCE**

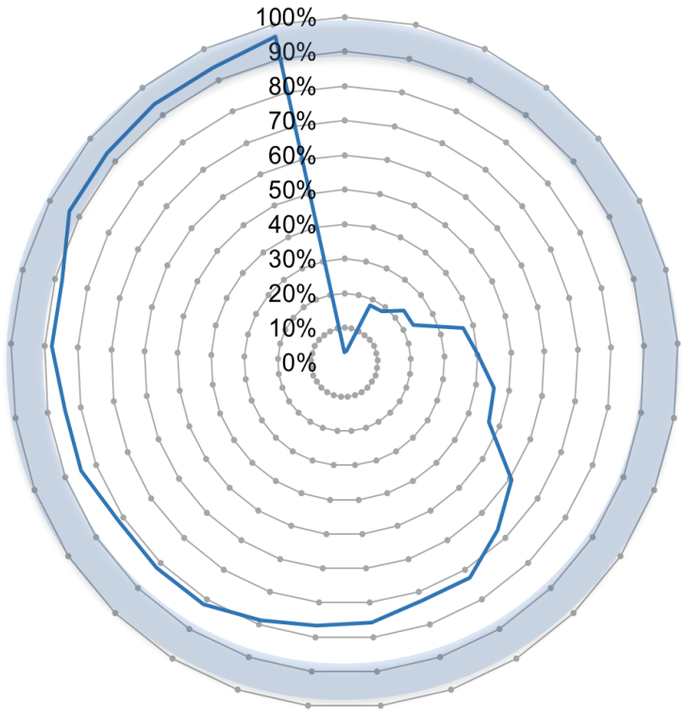
How important is the parameter to predict GO performance?



2.3.3. monitoring – importance PL Q – **IMPORTANCE GO PERFORMANCE**

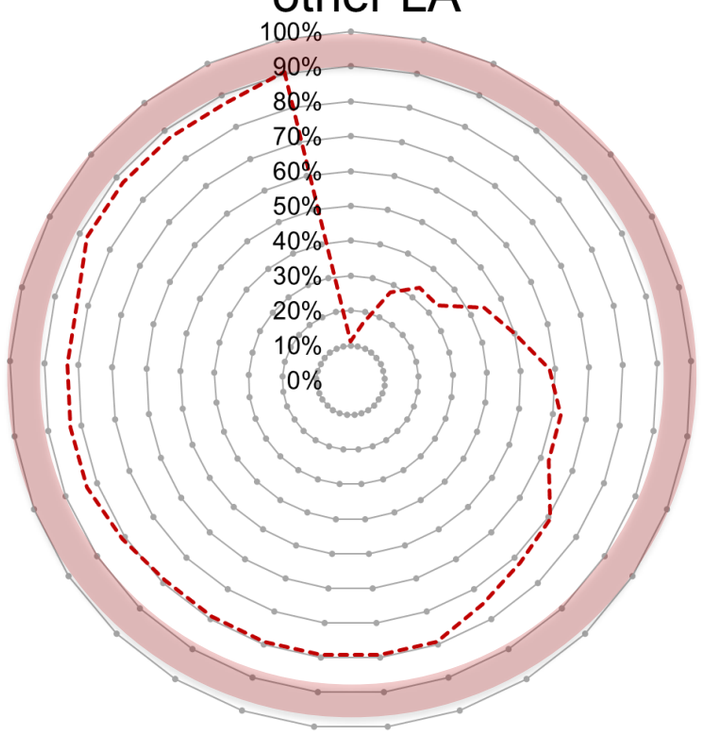
➔ most important parameters for predicting GO performance (score ≥ 90%)

Ecuador



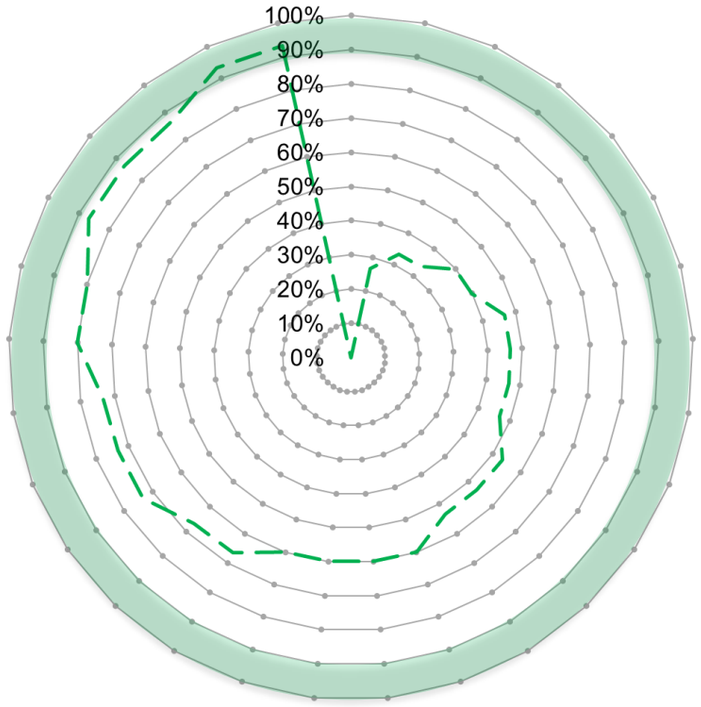
feeding activity
chromatophores
swimming activity
gut fulness

other LA



swimming activity	88%
feeding activity	88%
size variation (by eye)	88%
lipid globules in HP	88%

SEA



bacterial challenge test
pathogenic virus

PL count per g wet weight

3. Conclusions

- high awareness on concept PL Q and its importance for predicting GO performance
- frequently monitored parameters worldwide:
  survival, size variation (by eye), feeding and swimming activity, and gut fulness

little consensus on the most important parameters to estimate PL Q and to predict GO performance:

➔ higher importance of microbial parameters in SEA: site-specific challenges?

➔ interpretation PL Q may evolve over time?

3. Conclusions

Support for the following claims:

- strong link between PL quality and the incidence of disease
- differences in PL quality are reflected in nursery and grow-out phase
- improved hatchery protocols have a beneficial effect in nursery and grow-out phase

  ➔ The majority in Latin-America (including Ecuador) has results that confirm this beneficial effect

- PLs of higher quality imply a cost-benefit for the grow-out farmer

3. Conclusions

Cost to produce 1 million PL → 15.5 ton *P. vannamei* market shrimp

Assumptions: pond survival 75%; size at harvest 15g; FCR 1.2-1.5

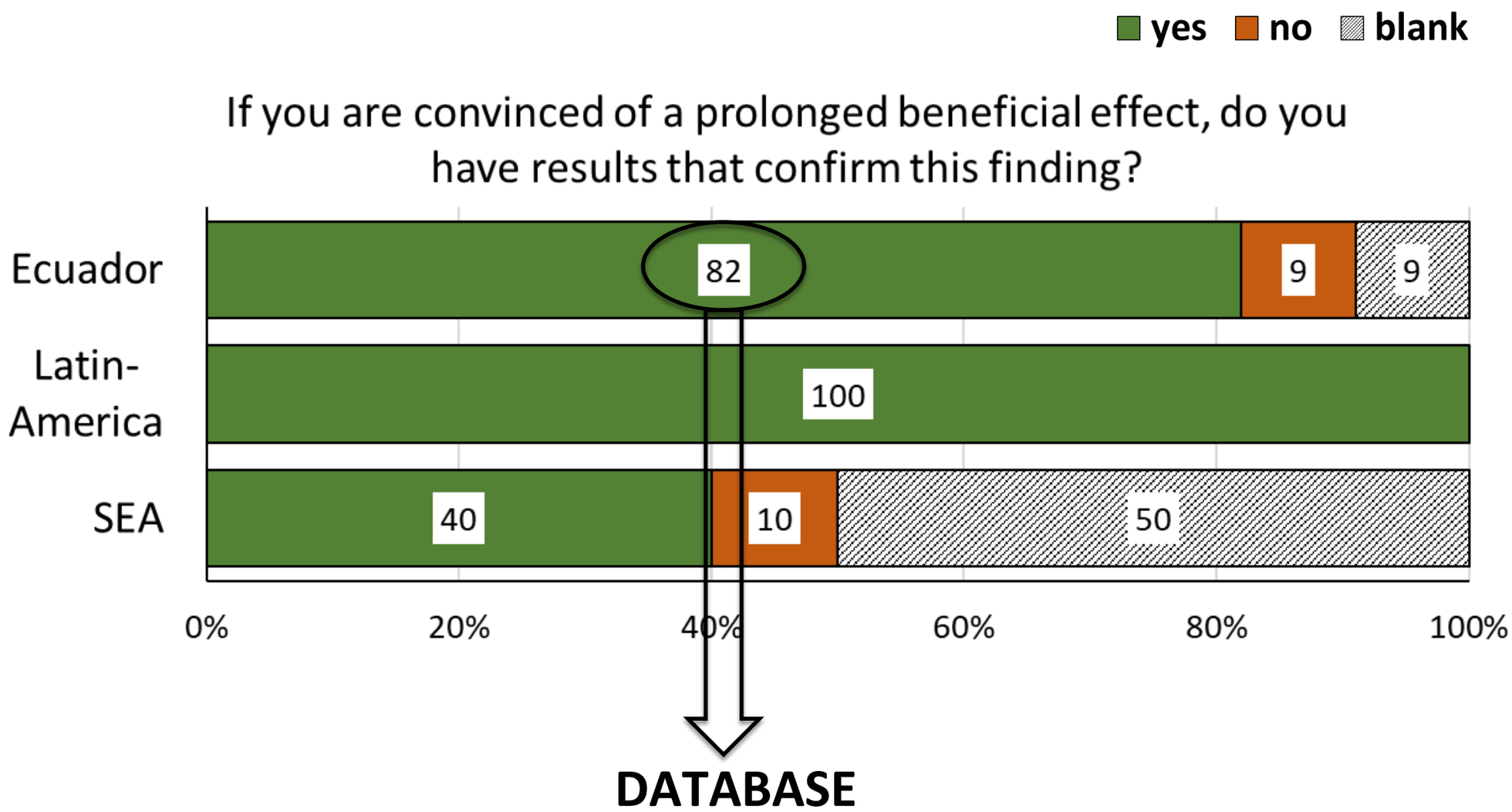
Group	PL production		GO Production		Total
	USD	%	USD	%	USD
feeds	550	27.4	24,413	55.6	24,962
labor	536	26.7	5,167	11.8	5,702
utilities	686	34.2	7,750	17.6	8,436
other	81	4.0	930	2.1	1,011
chemicals	8	0.4	5,167	11.8	5,175
health	143	7.1	517	1.2	660
sub total	2,004	100	43,943	100	45,946
management	306		5,167		5,473
capex	284		10,333		10,617
TOTAL	2,594	100	59,443		62,036

Not effective to drastically cut costs in hatchery phase

x 20

Gross margin is made in grow-out

4. Future



Unravel long-term, beneficial effects of **hatchery protocols** on **grow-out performance** through increased **PL quality**

THANK YOU
FOR YOUR ATTENTION!

QUESTIONS?