PREVENTION OF DISEASES AT LARGE SCALE INTEGRATED SHRIMP FARM THROUGH IMPLEMENTATION OF BIOSECURITY

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1. BACKGROUND

Success story of Indonesia shrimp farming

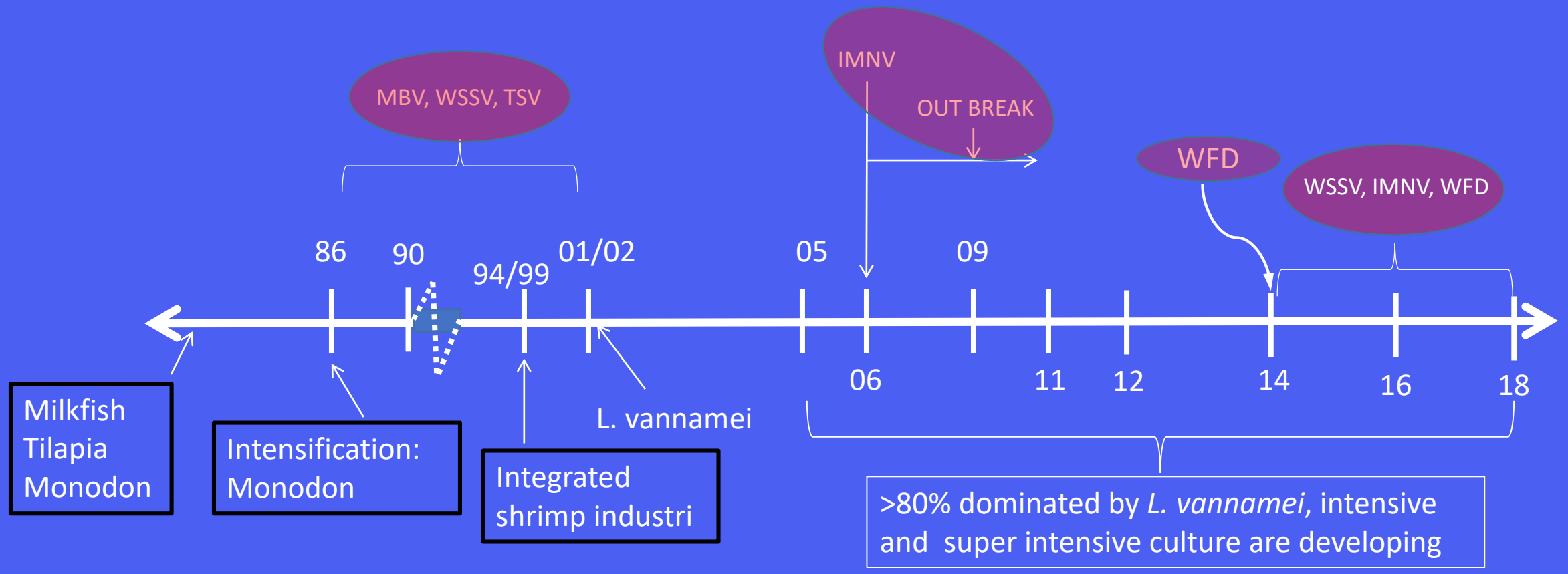
- 1978, eye ablation in Indonesia (Dr. Made L Nurjana, BWRD - Jepara)
- Since then: Backyard Hatchery growing rapidly
- 1986 Intensification of shrimp farming.
- 1990s large project in Lampung, Kalimantan
- 1994/1995 PT CPB, Lampung
- 1991 hatcheries: 204 units, backyard H 234 units
- Pond engineering has been developing rapidly (Plastic line, BIOCRETE, BIOSEAL,
- At Present: Super and Supra intensive (denst 125 – 1,000 Pl/m2)

PRODUCTION OF INDONEIA SHRIMP AQUACULTURE

Year	Production (MT)
2004	238,567
2005	279,539
2006	339,803
2007	330,155
2008	408,346
2009	299,050
2010	348,140*
2013	393,600
2015	386,314
2016	265,000**

Source: FAO (2010)
*Note: recent update by DGF
** WSSV, IMNV, WFD

2. HISTORY OF DISEASES IN INDONESIAN SHRIMP FARM



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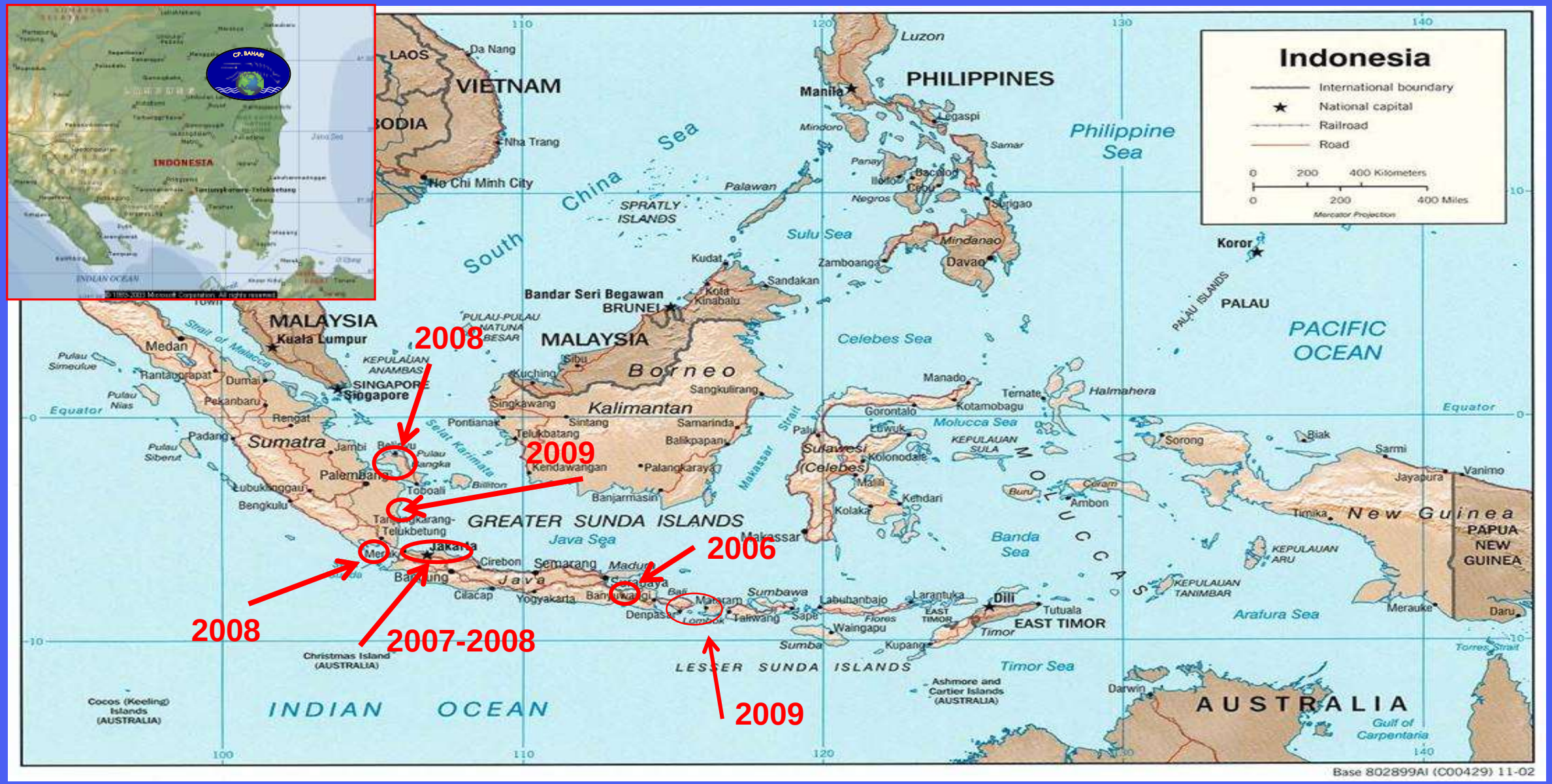
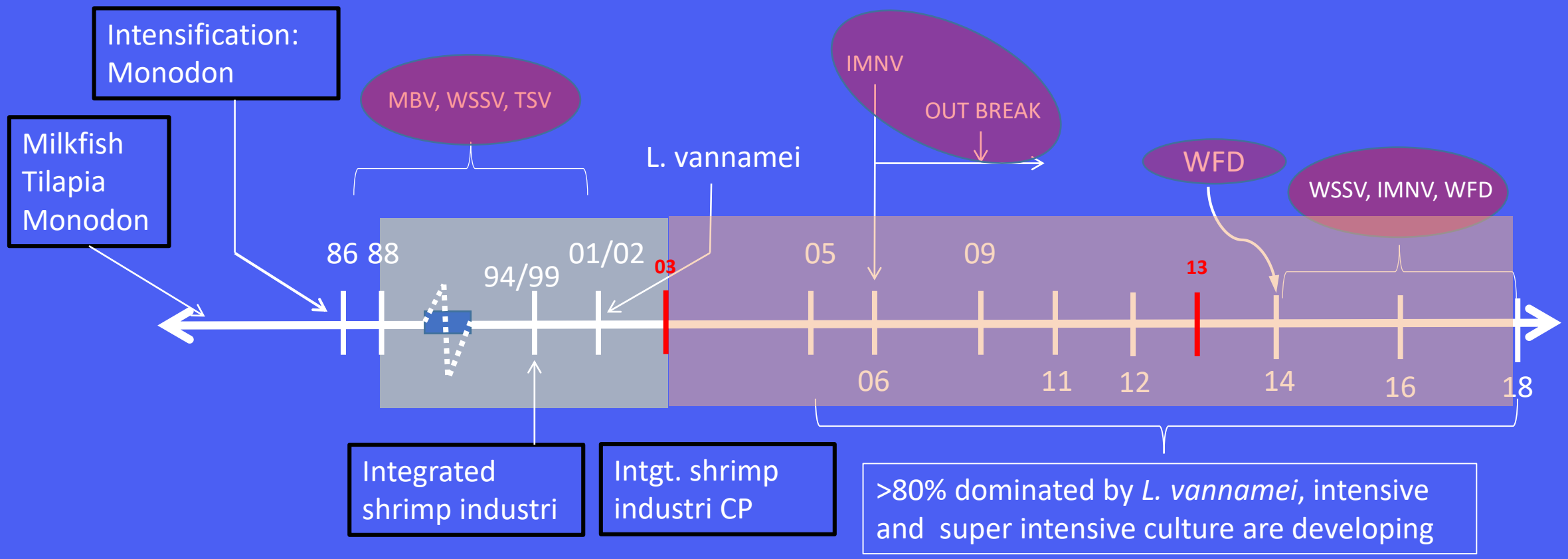
MAP OF IMNV OUT BREAK IN INDONESIA



HISTORY OF DISEASES IN INDONESIAN SHRIMP FARM



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3. MANAGEMENT STRATEGY FOR SUSTAINABLE PRODUCTION IN CONTAMINATED ENVIRONMENT

Fully integrated shrimp industry → supported by almost 10,000 employees, with production capacity:

Hatchery
14 Billion fry/year

Feed Mill
65,000 MT/year

Farm
60,000 MT/year

Food Processing
200 MT/day

CPB FARM

TOTAL PONDS : 3,754 units of each 0.5 ha

Biosecurity implementation as one of importance tools to maintain production

Definition (Horowitz 2003)

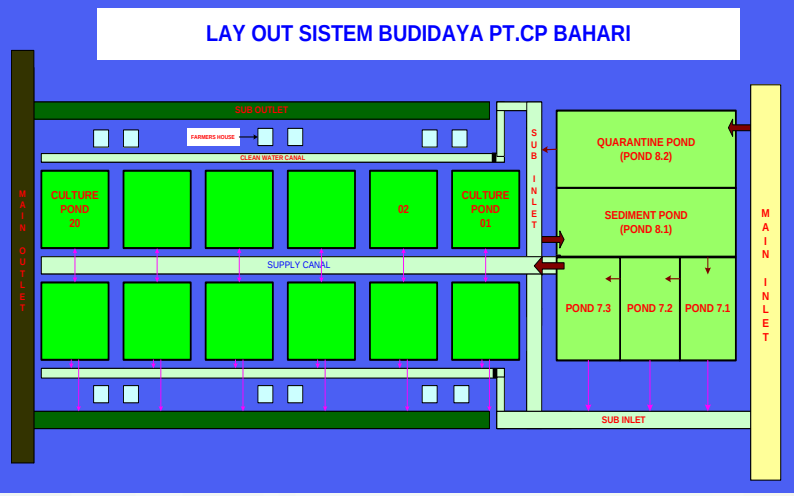
A series of measures designed primarily to prevent a disease from reaching the farm. Biosecurity can also be considered as measures used to decrease or prevent the spread of existing disease within a farm or a region

Degree of complexity is related to the farm size:

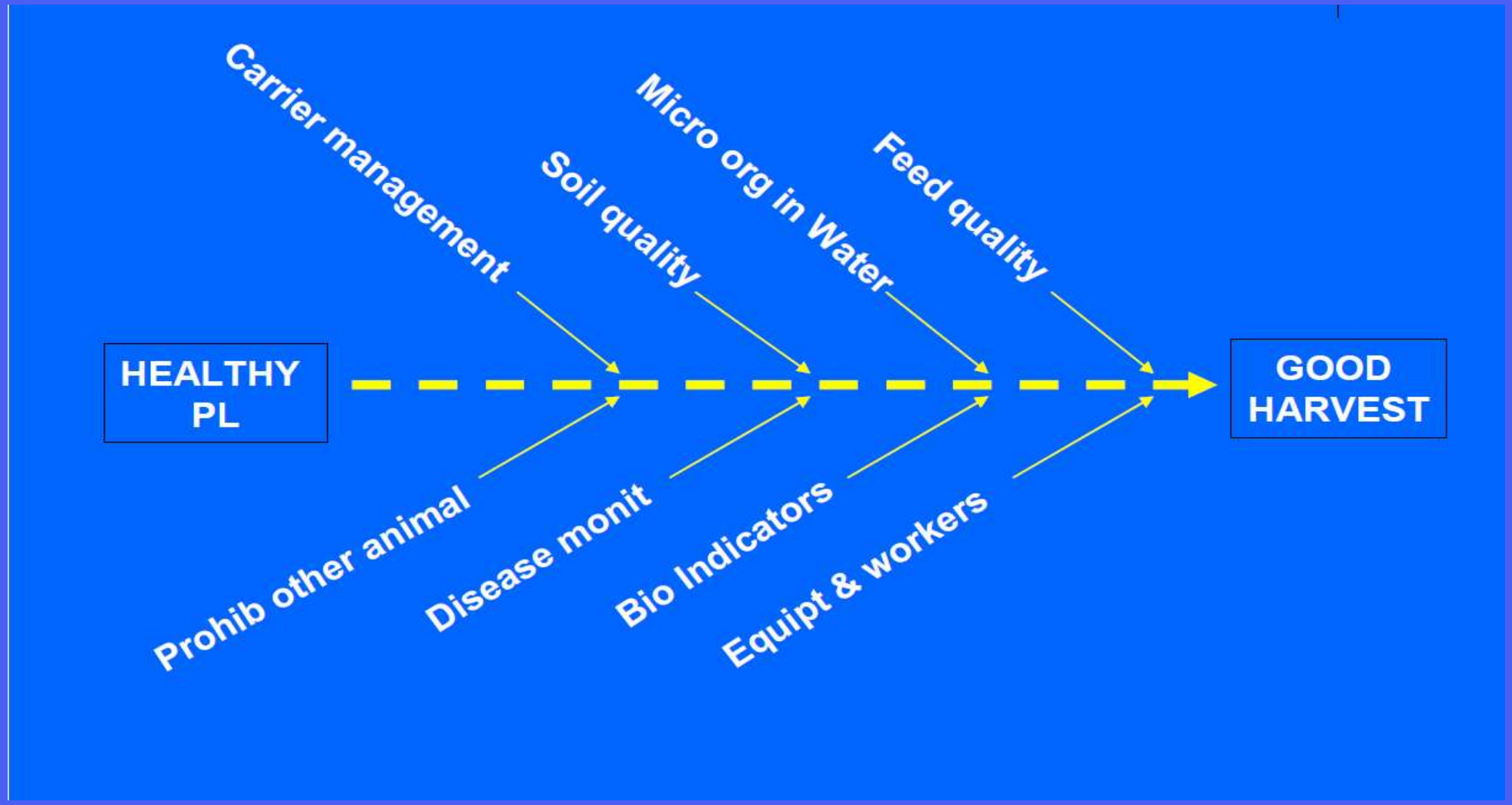
1. Small farms
2. Medium farms
3. Large farms

General characteristic:

1. Open access: not walled
2. Exposed: not roofed
3. Operation: Module system
4. Less water exchange
5. Treated incoming water



Factors influencing production



A. PLs
Use only strong and SPF PLs

SPF: WSSV, TSV, IHHNV, MBV,HPV

PCR TESTED/VERIFIED

	PARAMETERS	Standard value	
		vannamei	monodon
1.	PL-stage	≤ 13	≤ 15
2.	Length (mm)	≥ 8.1	≥ 10.7
3.	Size Variation	< 0.8	<0.8
4.	Plankton Behavior (%)		0-2
5.	Uropoda closed (%)		0 - 1.5
6.	Antenula open (%)		0 - 1.5
7.	MGR 4:1 (%)		>95
8.	SR on Stress test (%)		
	a. Formalin	≥ 95	≥ 95
	b. salinity	≥ 95	≥ 95
9.	Population in box (Pcs/4 L)	≤ 7000	≤ 4000
10.	Quality of water for transportation		
	a. DO (ppm)	≥14	≥16
	b. Temperatur (°C)	22 – 24	22 – 24
	c. pH	7.4 – 7.9	7.4 – 7.9
	d. Salinity (ppt)	12 - 30	12 - 30
	e. TAN	0 - 0.1	0 - 0.2

B. Disease Carrier Management

- Water intake:
  - Reservoir
  - Double screen 300 – 1000 um
  - Disinfection
- Protecting device
  - Bird Scaring Device (BSD)
  - Crab Protecting Device (CPD)

Eliminate vectors: liming, filtration, chlorination, Dichlorvos.

- Liming: burned lime (CaO); hydrated lime (Ca(OH)2).
  - Lime is not particularly soluble in water and difficult to apply uniformally.
  - It is virtually impossible to achieve a uniformally high pH in ponds through lime treatment.
  - Liming is not considered highly effective in eliminating vectors of viral diseases.
- Fine mesh filters (mesh size of 500 um).
  - Quickly become clogged, and the fabric often rips.
  - Filtration is not considered practical or effective for treating source water at large shrimp farms.

- Chlorination with calcium hypochlorite ($Ca(ClO)_2$), or HTH
  - Toxicity declines with increasing pH and increasing organic matter.
  - Source water for shrimp : pH around 8 and contains organic matter.
  - The effective treatment rate for HTH normally is 20 to 30 mg/L.
  - The effectiveness of treatment with lower concentrations is highly variable.
  - HTH is expensive

- Dichlorvos or 2,2-dichlorovinyl dimethyl phosphate is an organophosphate, highly toxic to small crustaceans and has a short residual life in water.
  - to control fish parasites (such as See Lice) >>>> in some European countries (Norwey, for Atanlantic salmon and rainbow trout).
  - since 2003 dichlorvos has been widely used in intensive shrimp farming in Indonesia

C. Soil Quality monitoring

Std pH
> 6.5

Range pH	January		June		Desember	
	n	%	n	%	n	%
<6.5	74	15.74	101	25.9	30	9.35
6.5 - 7.5	325	69.15	214	54.87	150	46.73
>7.5 - 8.0	71	15.11	75	19.23	141	43.93
Total Pond	470		390		321	

Std ORP
> +50

Range ORP	Januariy		June		Desember	
	n	%	n	%	n	%
<-150 - (-100)	3	0.658	8	2.051	4	1.25
>-100 - (- 50)	4	0.877	22	5.641	16	4.95
>-50 -- (+ 50)	74	16.23	81	20.77	49	15.26
> + 50	375	82.24	279	71.54	252	78.5
Total Pond	456		390		321	

D. Microorganisms in Water

- Plankton as natural feed (transparency 60 – 80 cm
  by the stocking and 25 – 40 cm during the rearing period
- Control on microbial community
  TVC has to be < 2 x 10^3 cfu/ml
  Green colony < yellow colony

E. Feed quality

- Feed quality control:
  bought from reputable company
  control on the standard quality.
- Feeding implementation:
  - prevent over feeding
  - strictly monitored (SR, FR, feeding tray)

F. Prohibition of other animals

- Avian (chicken, exotic bird)
- Mammal (dog, goat)

G. Diseases Monitoring

- Water intake : weekly (WSSV, TSV)
- Pond (every symptoms)
- Health monitoring : DOC 20, 40, 60, 80

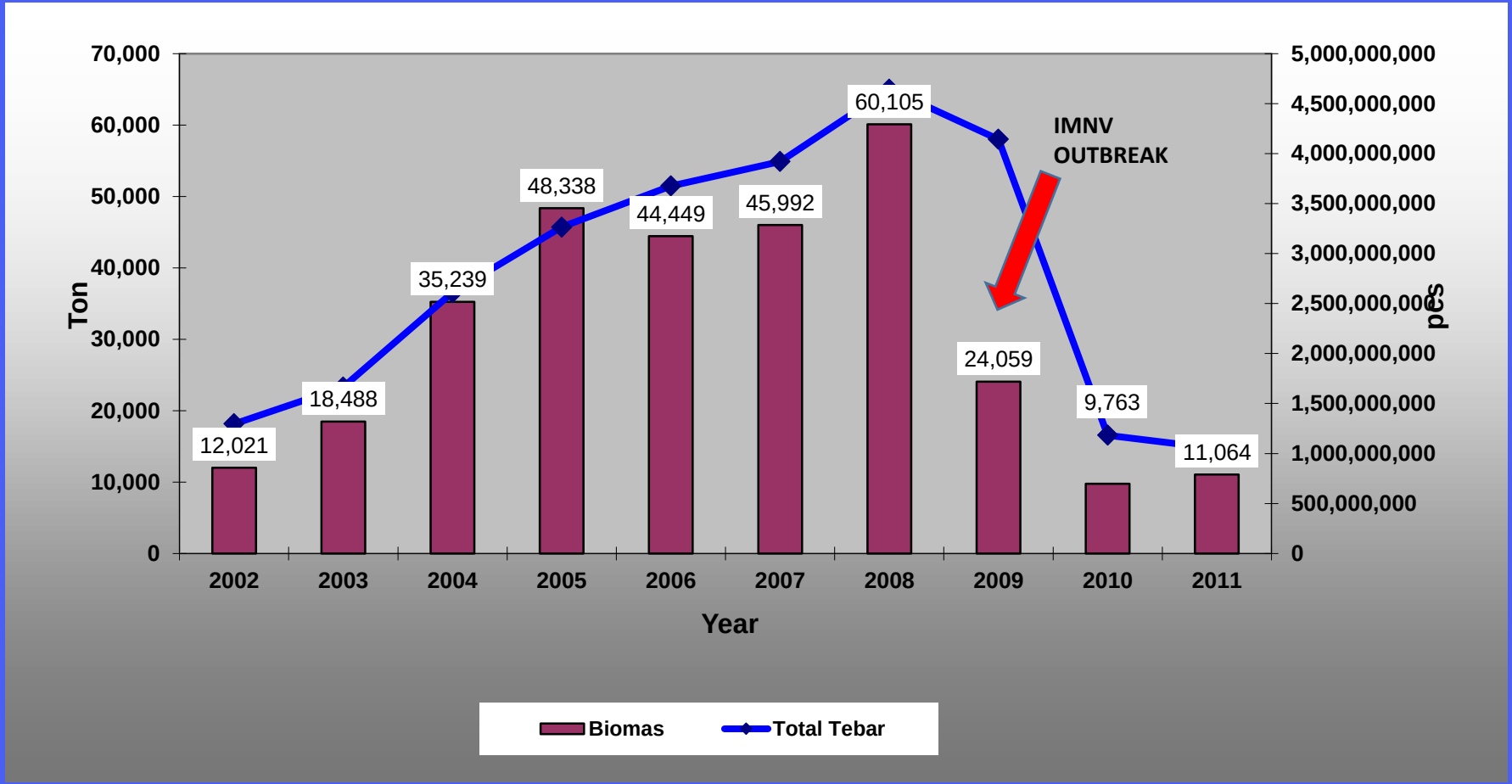
H. Bio Indicator

- 2 net cages installed at inlet (2 x 2 x 1) m^3
- 100 Shrimps of 10 – 15 gr
- Daily observation on mortality
- PCR test for viral diseases if necessary

I. Control on the movement of equipments and workers

- Disinfection off all equipments before used
- No visitor is allowed to enter if within the last 3 days have been visited other farm
- Wash the vehicle if possible

Production achievement



Farmer ponds 2007

Range of Tonase (ton/pond)	Number of ponds based on tonage ranges and months											
	Jan	Feb	Mar	Apr	Mei	Juni	Juli	Agst	Sept	Okt	Nove	Des
≥ 6.0	380	332	297	218	363	497	364	341	191	275	503	411
5.5 - <6.0	19	18	9	15	56	60	43	40	28	21	10	7
5.0 - <5.5	10	15	10	16	33	29	19	26	25	8	7	11
4.0 -<5.0	13	13	11	61	37	21	13	18	29	10	12	9
3.6 - <4.0	7	2	6	29	14	4	5	5	1	3	5	1
2.0 - < 3.6	12	7	26	77	72	15	4	11	7	8	4	4
< 2.0	7	4	10	20	25	9	1	4	1	4	1	2

Farmer ponds 2008

Range of Tonase (ton/pond)	Number of ponds based on tonage ranges and months											
	Jan	Feb	Mar	Apr	Mei	Juni	Juli	Agst	Sept	Okt	Nove	Des
≥ 6.0	454	501	447	316	539	438	362	450	382	326	423	369
5.5 - <6.0	5	1	4	2	9	10	16	6	17	16	29	13
5.0 - <5.5	4	1	3	2	8	23	7	11	7	8	9	16
4.0 -<5.0	2	3	5	6	18	41	20	14	14	8	20	21
3.6 - <4.0	1	1	1	2	4	13	5	5	10	6	6	12
2.0 - < 3.6	1	1	1	3	18	32	29	32	16	5	12	14
< 2.0	1	1	2	2	8	10	4	9	2	4	6	2

Farmer ponds 2009

Range of Tonase (ton/pond)	Number of ponds based on tonage ranges and months											
	Jan	Feb	Mar	Apr	Mei	Juni	Juli	Agst	Sept	Okt	Nove	Des
≥ 6.0	454	420	405	60	3						2	1
5.5 - <6.0	10	25	37	17	4						4	6
5.0 - <5.5	12	19	22	21	7	3			1		7	3
4.0 -<5.0	11	48	61	86	39	9		4	3	12	40	19
3.6 - <4.0	1	15	17	32	33	4	3	7	5	14	14	14
2.0 - < 3.6	14	32	92	141	207	149	142	189	40	135	85	170
< 2.0	5	13	202	90	245	484	246	127	23	70	71	112

4. CERTIFICATION, TRACEABILIT, FOOD QUALITY AND SAFETY

COMPANY POLICY ON TRACEABILITY:

Put at a high priority “the ability to trace back information's/data through out the production chain (from processing plant, farming, to hatchery)” in regard to food safety, and production improvement.

1. Related to Food Safety and quality
2. Related to production improvement

Traceability for food safety and quality means:

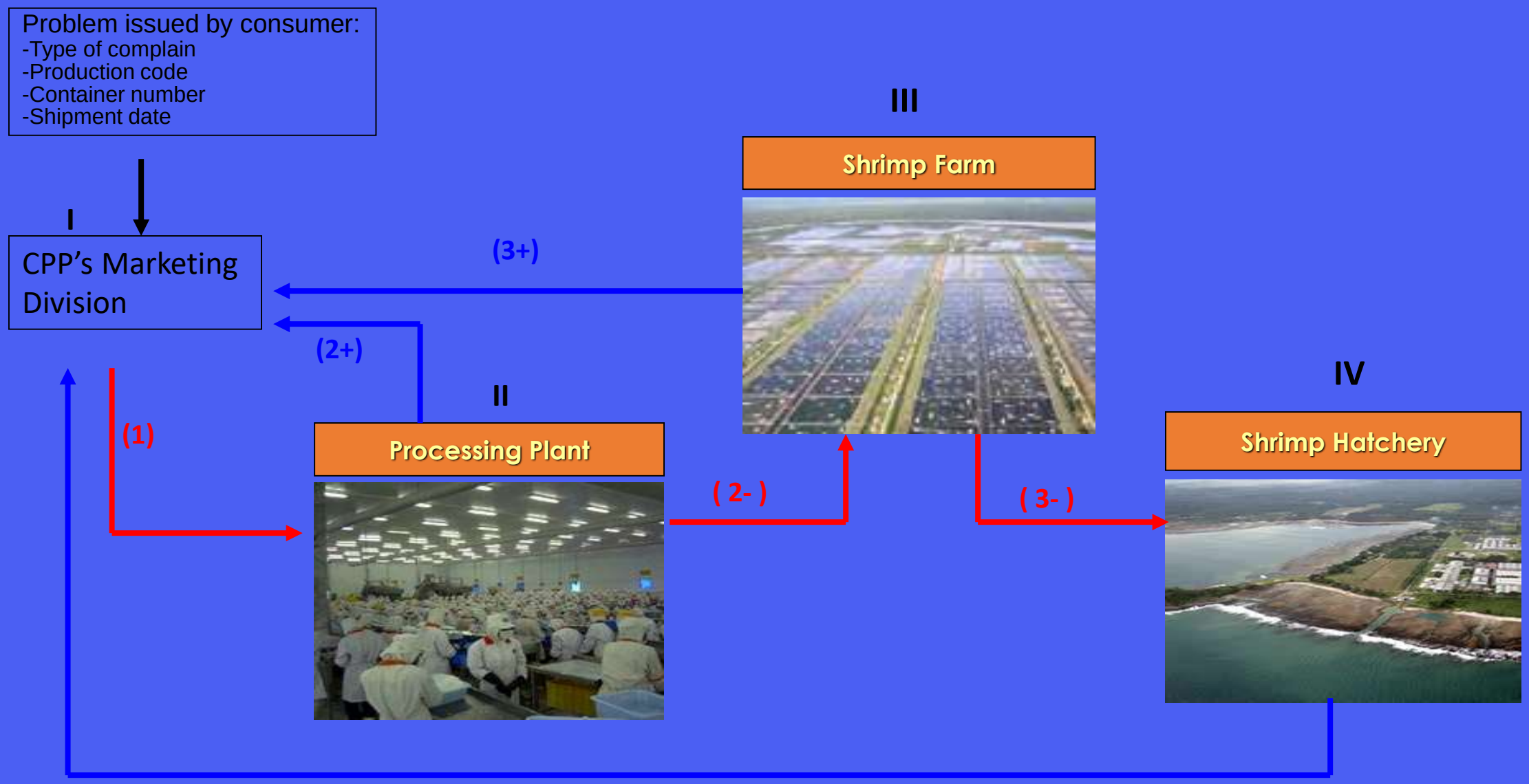
a. The ability to trace back the possible sources if HAZARD found by retailer (consumer)

b. The ability to trace back from processing plant back ward to farm and hatchery

c. What hazard can we trace?

- Physical : Metals and other foreign materials
- Chemical: antibiotics (NF, CA), pesticides, and heavy metals
- Biological: Vibrio sp, Salmonella, EC, CF and Listeria

The PathTraceability for food quality and safety



(i) Traceable parameters at Processing Plants - Conventional Product

PROCESS STAGES	CHECK POINTS (Available data for traceability purpose)	DOCUMENTATION FORM
1. RECEIVING RAW MATERIAL	•Delivery time from ponds to receiving area •Shrimp core temperature •Organoleptic •Pond address • Antibiotic OTC/OXO, CHLORAMPENICOL •Microbiology: Vibrio sp, Salmonella, E coli, Coli form • Chlorine concentration (if used)	•Receiving Log & Fressness Level •Concentration chlorine monitoring •Antibiotic Analysis Report •Microbiological Analysis Report
2. DEHEADING	•Shrimp core temperature •Room, and water temperature •Chlorine concentration (if used)	•Shrimp and room temperature report •Concentrastion chlorine monitoring
3. CORRECTION Conventional product	•Shrimp core temperature •Room, and water temperature	•Shrimp and room temperature report
4. TREATMENT (If necessary for HOSO prod)	• Soaking chemical used and its concentration • Time of soaking • Temperature during treatment	•Treatment Monitoring Report
5. WEIGHING & CODING	• Shrimp core temperature •Room, and water temperature	•Shrimp and room temperature report

(ii) Traceable parameters at Farm

Process	Check Points (Available Data for Traceability)		Documetation Form
Pond Preparation	Chemical used		Traceability Aquaculture Form I
Water Preparation	1. Disinfectant 2. Fertilizer	3. Probiotics	Traceability Aquaculture Form II
Fry Stocking	Fry Code		Traceability Aquaculture Form III
Water Management	1. Chemical 2. Pesticide residue 3. Heavy Metal residue	4. Fertilizer 5. Probiotics	1. Traceability Aquaculture Form IV 2. Pesticide & Heavy Metal quarterly monitoring report
Blind Feeding	1. Feed		1. Feed Usage report 2. Traceability Aquaculture Form Va
Post Blind Feeding	1. Feed 2. FCR	3. Syphoning activity	1. Feed Usage report from warehouse 2. Traceability Aquaculture Form Vb
Harvesting	1. Pond address 2. Stocking history 3. Production performance	4. Weekly Sampling 5. Feeding Strategy 6. Water Quality	Traceability Aquaculture Form VI

iii. Traceable parameters at Hatchery

Proses Stages	Check Point	Traceability worksheet (computerize and link data)
Broodstock	1.Source/Origin	Hatchery Traceability Report in broodstock data section
Larvae Culture	1.Artificial Feed (Type, quantity & lot) 2. Chemical 3. Fertilizer 4. Probiotic 5. Water (Heavy metal, Pesticide)	Hatchery Traceability Report in Feed & Medicine section. Feed lot number and water quality (heavy metal & pesticide) are needed to link for food safety traceability completion.

subject to: cosco audit (29, January 2008)

FARM CERTIFICATES

Good Aquaculture Practices,
Ministry of Marine Affairs & Fishery,
Indonesia (2004)

Aquaculture Certification Council
(2006)

GlobalG.A.P.
(2009)

Traceability, Food Safety, Environment, Community, Quality Management System

THANK YOU