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Shrimp Production in ASP Systems, CP Indonesia: Development of the Technology from R&D to Commercial Production

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Acknowledgement

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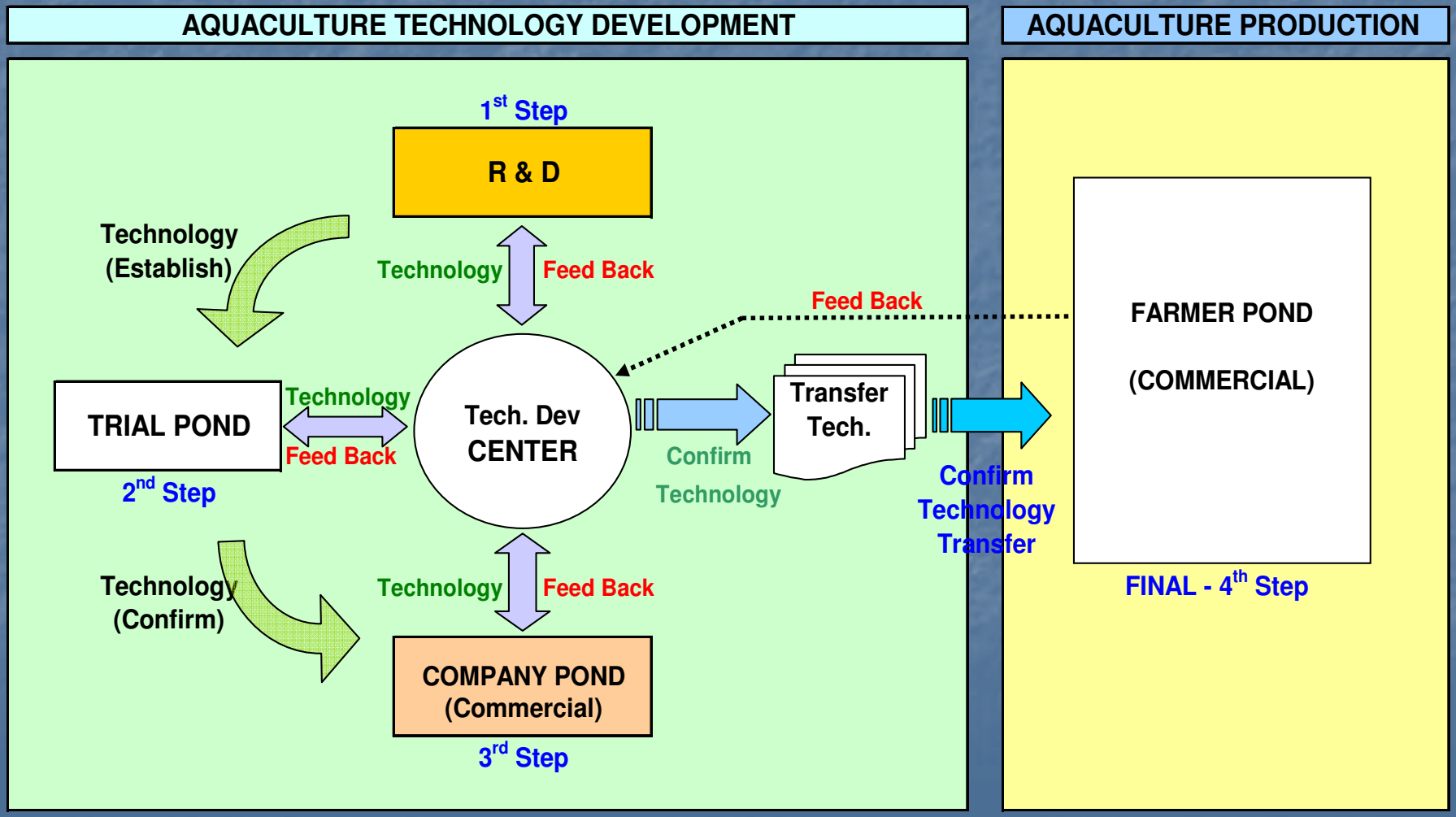
Introduction

Shrimp farming has become competitive and as such the technology utilized needs to be efficient in all aspects – productivity, quality, sustainability, bio-security and to be in line with market demand.

The concept has prompted the industry to give emphasis on having a strong field R&D and trials for commercial utilization.

Present ASP (microbial floc) system is one of the major contributions of R &D for commercial application. The system has been partially presented at World Aquaculture 2005 in Bali (Nyan Taw, 2005b; Nyan Taw & Saenphon Ch., 2005; Saenphon Ch. et.al. 2005)

Technology Development Strategy



Technology Development Objectives

1. To develop productive and efficient culture technology for farmer commercial ponds.

2. To diversify technology and culture species to be more competitive in the industry.

3. To enhance the technicians' intellect

Technology Development Policy

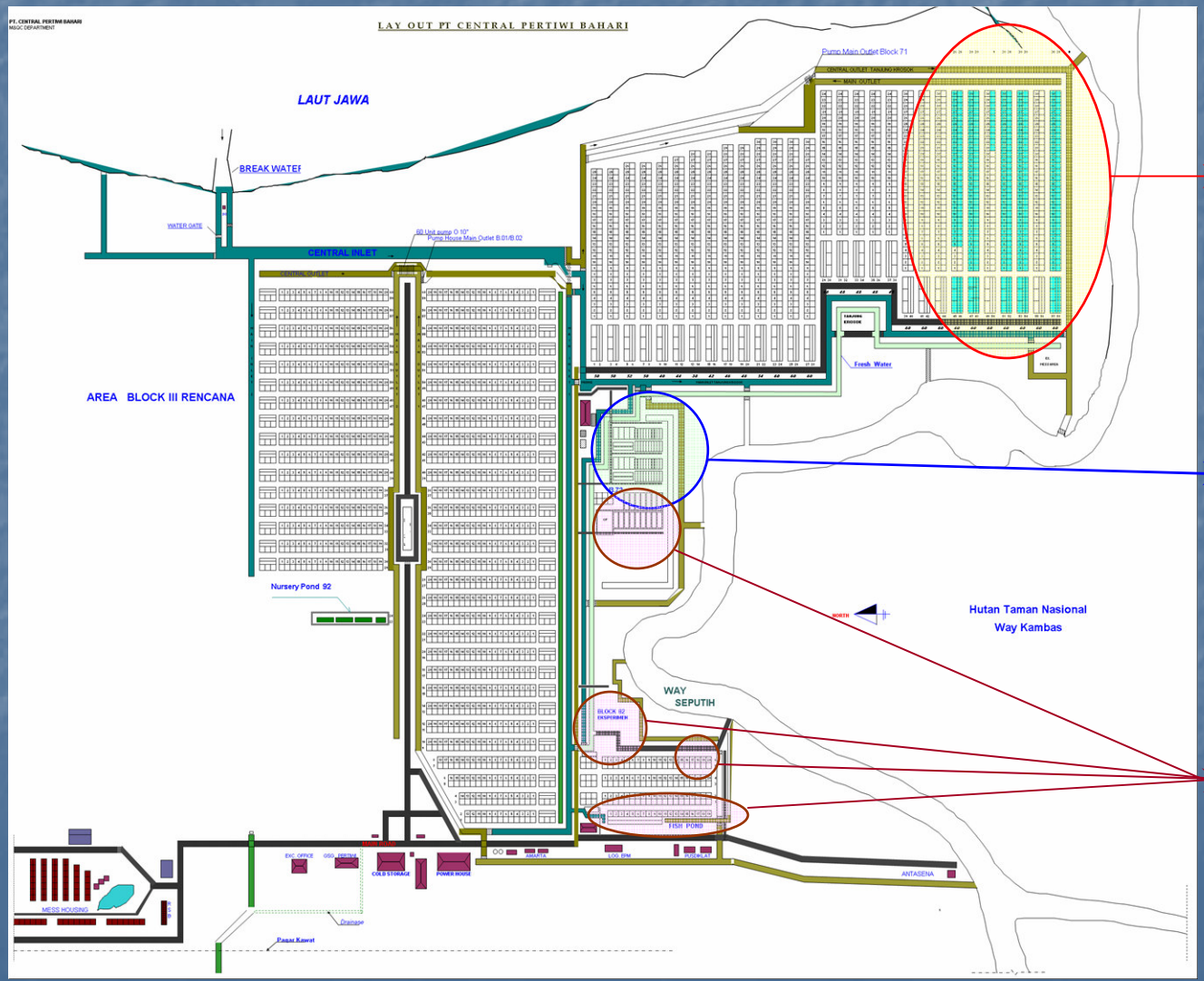
R & D and Trials

1. Inline with CPB production policy
2. Focus on one unknown factor
3. Minimum duplicates (ponds) be used for quality results
4. Minimum 2 cycles (2 seasons) be tried if required
5. Protocol be approved by VP responsible

Company Commercial Trials

1. Trials proven by R&D and Trials for commercial applications
2. Minimum 10 ponds be used for quality results
3. Protocol be approved by VP responsible

Technology Development Locations



Commercial Trial Pond

GROW OUT PONDS

Full-PE lined (5,000m2)	- 189 ponds
Semi-PE lined (5,000m2)	- 26 ponds
Earthen (5,000m2)	- 86 ponds
Total	**- 301 ponds**

R & D Pond

GROW OUT PONDS

Full-PE lined (5,000m2)	- 12 ponds
Semi-PE lined (5,000m2)	- 26 ponds
Earthen (5,000m2)(**CPI**)	- 2 ponds
Total	**40 ponds**

NURSERY

Full PE lined (72m2)	- **20 tanks**

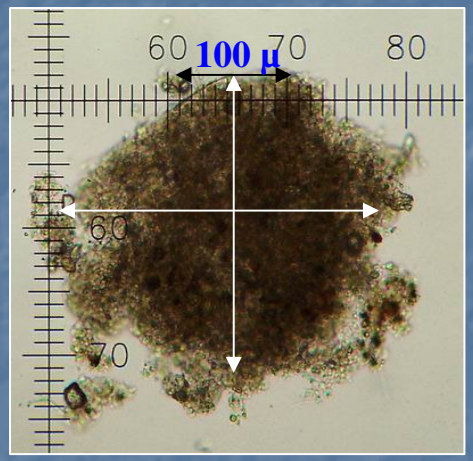
Trial Pond

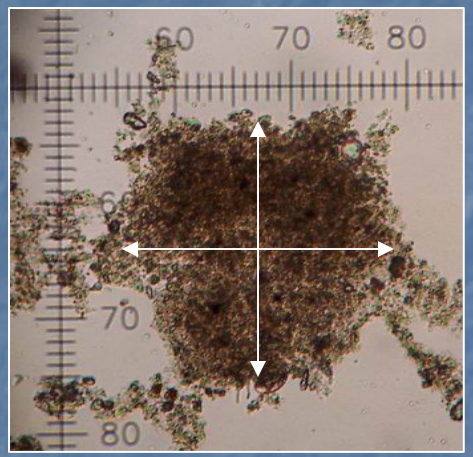
GROW OUT PONDS

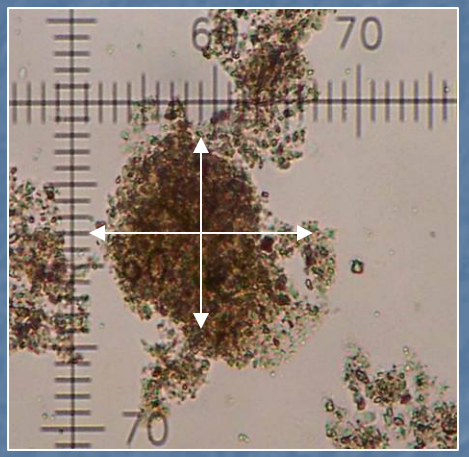
Intensive (Full PE lined)	- 27 ponds
Intensive (Semi PE lined)	- 10 ponds
Intensive (Earthen)	- 21 ponds
Extensive (Earthen)	- 15 ponds
Total	**73 ponds**

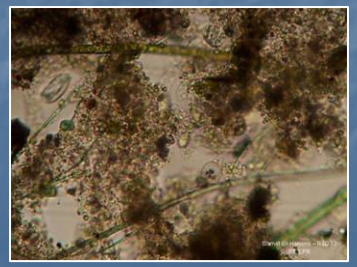
The ‘FLOC’

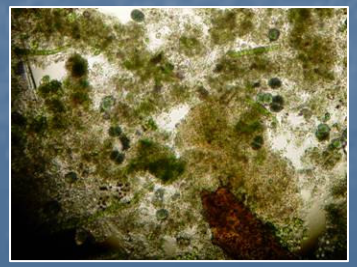
FLOC COMMUNITIES AND SIZE











Brown **Green**

The ‘FLOC’

Defined as macroaggregates – diatoms, macroalgae, facial pellets, exoskeleton, remains of dead organisms, bacteria, protest and invertebrates.
(Decamp, O., et al 2002)

As Natural Feed (filter feeders – *L. vannamie* & Tilapia) : *It is possible that microbial protein has a higher availability than feed protein (Yoram, 2005)*

Sampling Method

Measuring procedure

1 liter / 2 places/ 15 cm deep/ between 10-12 am

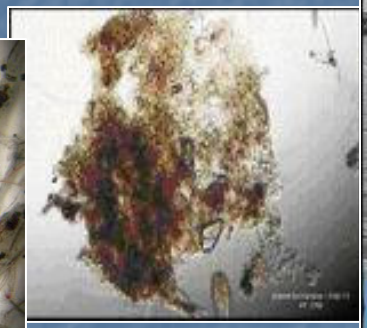
Let it settled for 15-20 minutes

Read density of flocs in cone (ml/l)

The Basic

1. High stocking density - over 130 PL10/m2
2. High aeration – min 28 HP/ha paddle wheels energy input
3. Grain pellet
4. HDPE lined ponds

High density



Microbial Flocs

High aeration

Grain pellet

Settled flocs

Pond Water Preparation

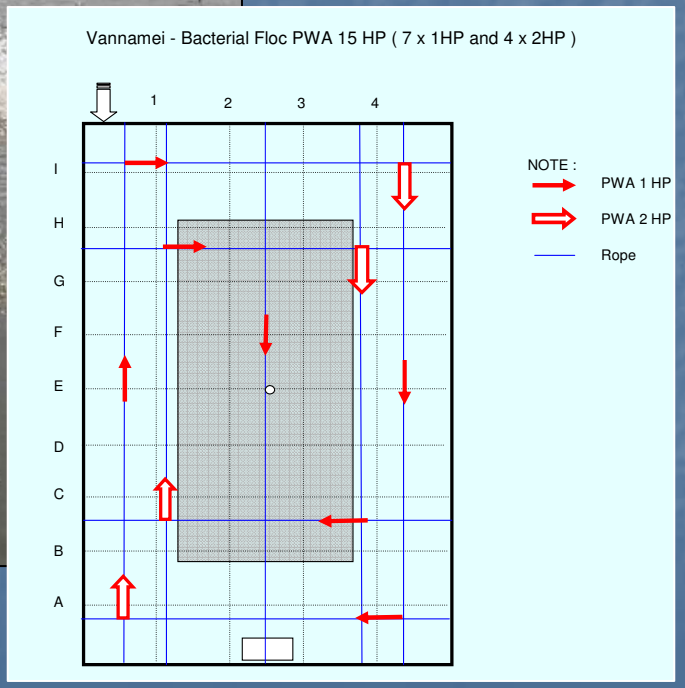
For already treated water in series of treatment reservoirs in HDPE lined 0.5 ha production ponds

Day	Activity
1	Urea 8 kg & TSP 1 kg Grain pellet 30 kg & Dolomite 50 kg
2	Tea seed cake 15 ppm
4	Grain pellet 30 kg & Dolomite 50 kg
6	Grain pellet 30 kg & Dolomite 50 kg
8	Grain pellet 50 kg, Molasses 8 kg & Kaolin 50 kg
10	Grain pellet 50 kg
12	Kaolin 50 kg

Pond Operation
High Aeration

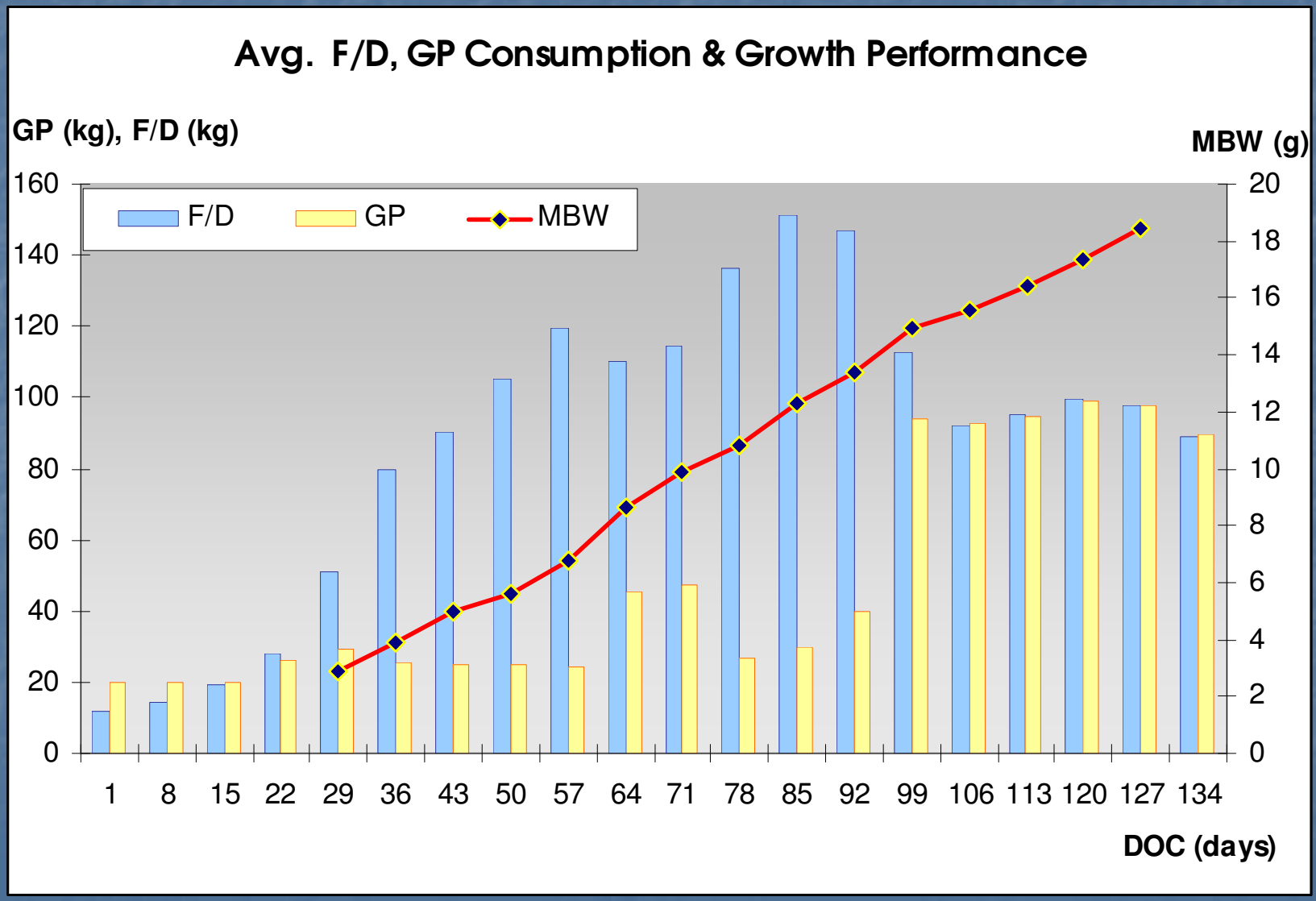
Feeding

Siphoning



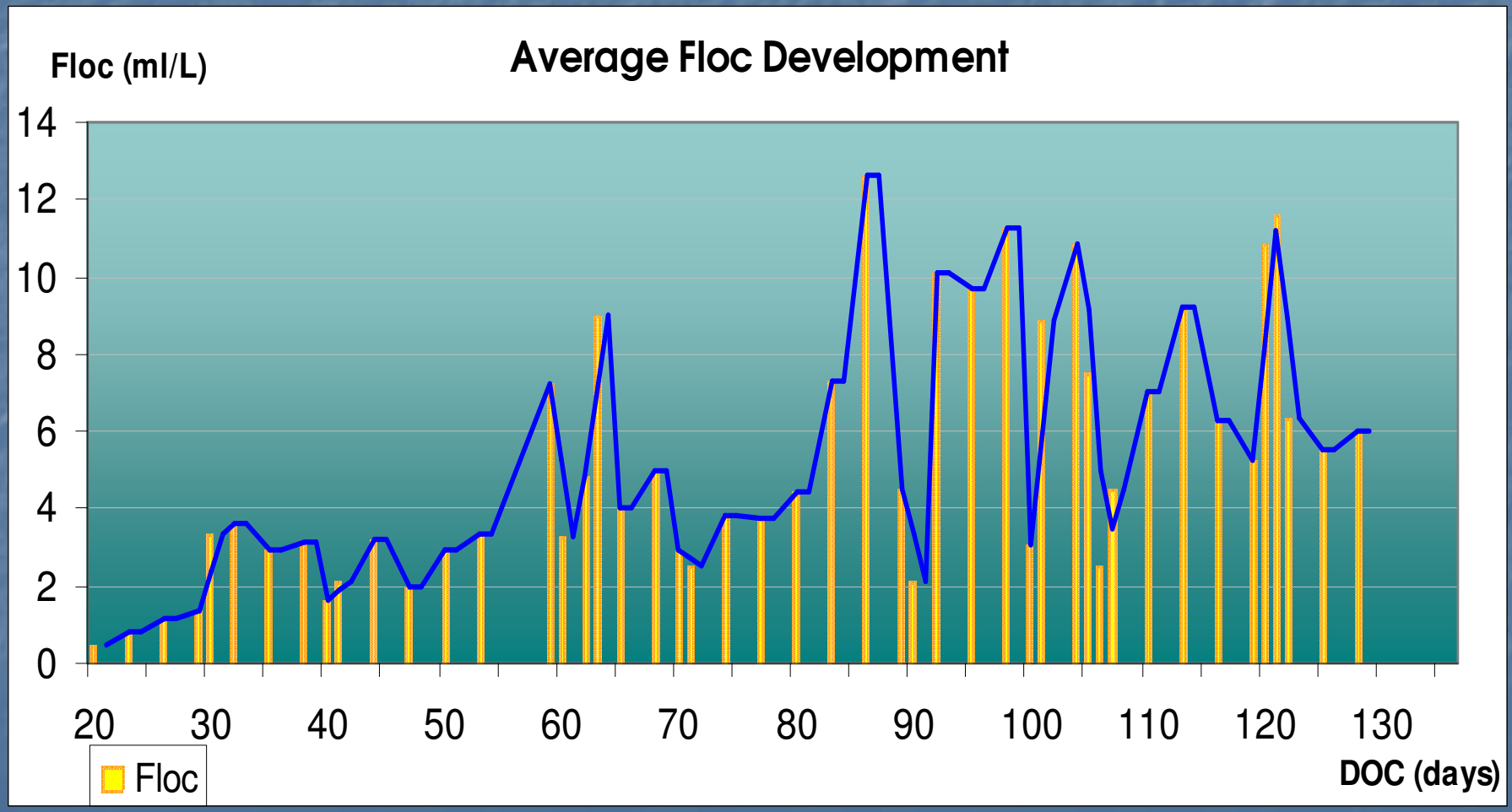
Paddle Wheels position

Feed and Growth



Company Commercial ponds - Block 71 Module 24 Row 47

‘Floc’ Development



Company Commercial ponds - Block 71 Module 24 Row 47

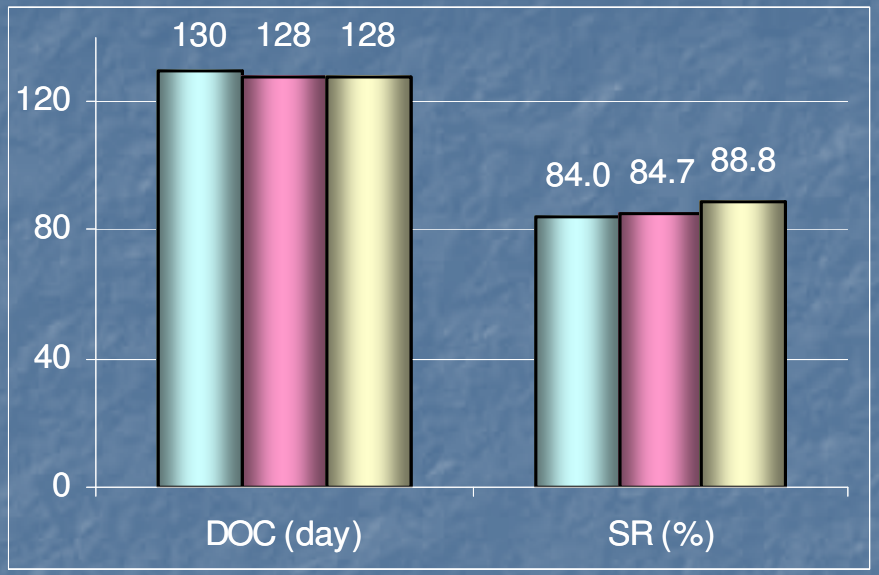
Environment

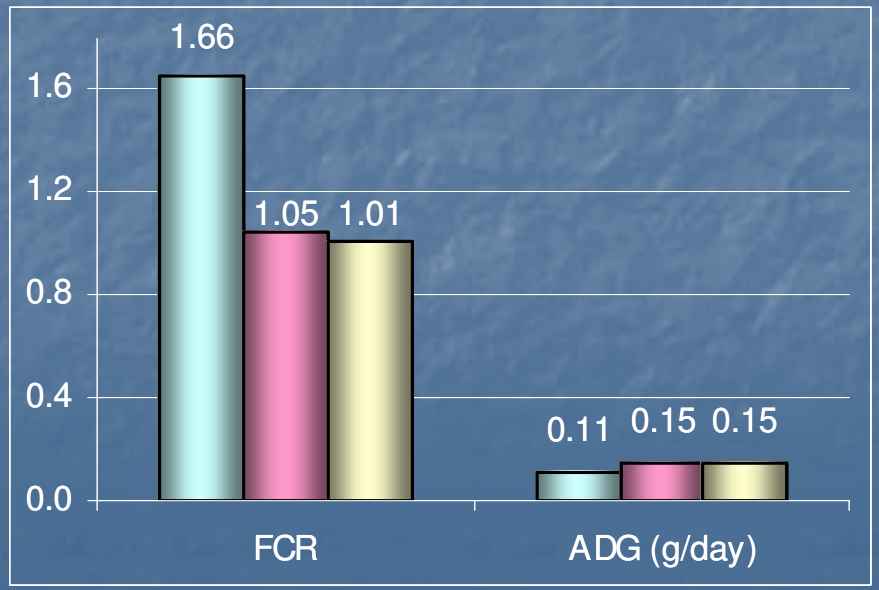
Pond water quality	min	max
Dissolved Oxygen (ppm) am	3.6	5.2
Dissolved Oxygen (ppm) pm	5.2	7.9
pH am	7.3	8.4
pH pm	7.3	8.6
Temperature (° C) am	25.9	29.2
Temperature (° C) pm	27.5	31.6
Salinity (ppt)	20	34
Transparency (cm)	30	90
Total Alkalnity (ppm)	55	147
Total Ammonia Nitrogen (TAN) (ppm)	0.03	1.60
NH_3N (ppm)	0.01	0.14
NO_2N (ppm)	0.01	22.91
PO_4P (ppm)	0.12	2.41
Flocs (ml/Litre)	0.2	13.0

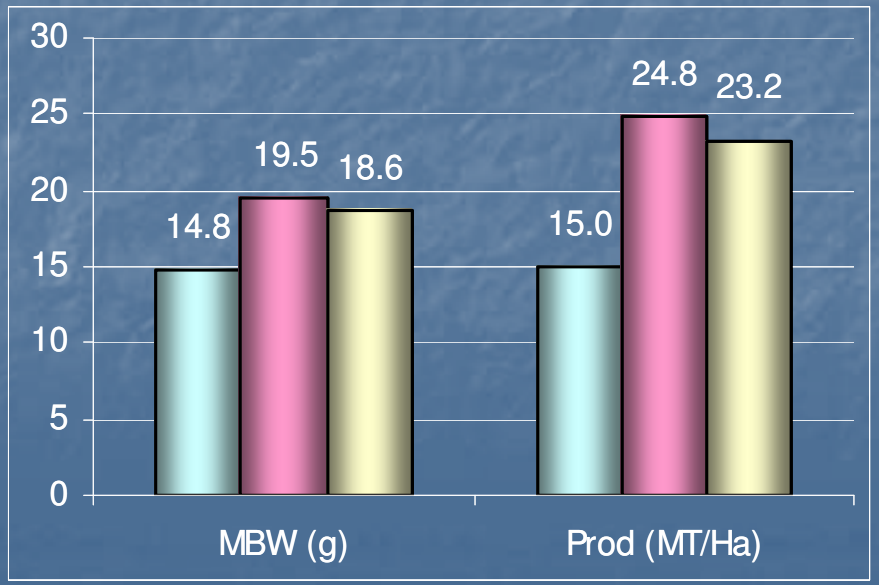
Company Commercial ponds - Block 71 Module 24 Row 47

Trials - Performance

Description	Earthen	Semi-HDPE	Full-HDPE
Dens (pcs/m2)	134	140	150
DOC (day)	130	128	128
MBW (g)	14.8	19.5	18.6
Prod (MT/Ha)	15.0	24.8	23.2
SR (%)	84.0	84.7	88.8
FCR	1.66	1.05	1.01
ADG (g/day)	0.11	0.15	0.15







First Commercial Trial

Description	Average Per Code					
Fry Code	(12) A416	(12) A417	(12) A418	(11)A420	(12) A539,A416	Avg
Tot pond	5	6	7	5	3	26
STD(pcs/m²)	131	131	130	131	131	131
DOC (day)	148	146	150	146	146	147
Biomass(kg)	11,337	10,587	10,650	10,886	11,256	10,883
MBW (g)	16.78	17.66	17.61	17.89	16.38	17.4
CV (%)	24.2	21.2	26.8	21.4	21.3	23.0
FCR (- GP)	1.01	1.09	1.08	1.03	0.98	1.04
FCR (+ GP)	1.69	1.83	1.82	1.70	1.64	1.73
SR (%)	100.0	91.6	92.8	92.8	105.0	95.9
ADG (g/day)	0.11	0.12	0.12	0.12	0.11	0.12
Prod (g/m²/crop)	2,267	2,118	2,130	2,177	2,251	2,176

*** Semi – HDPE ponds (R&D , CPI and CCP, CPB, 2003)

Commercial Performance

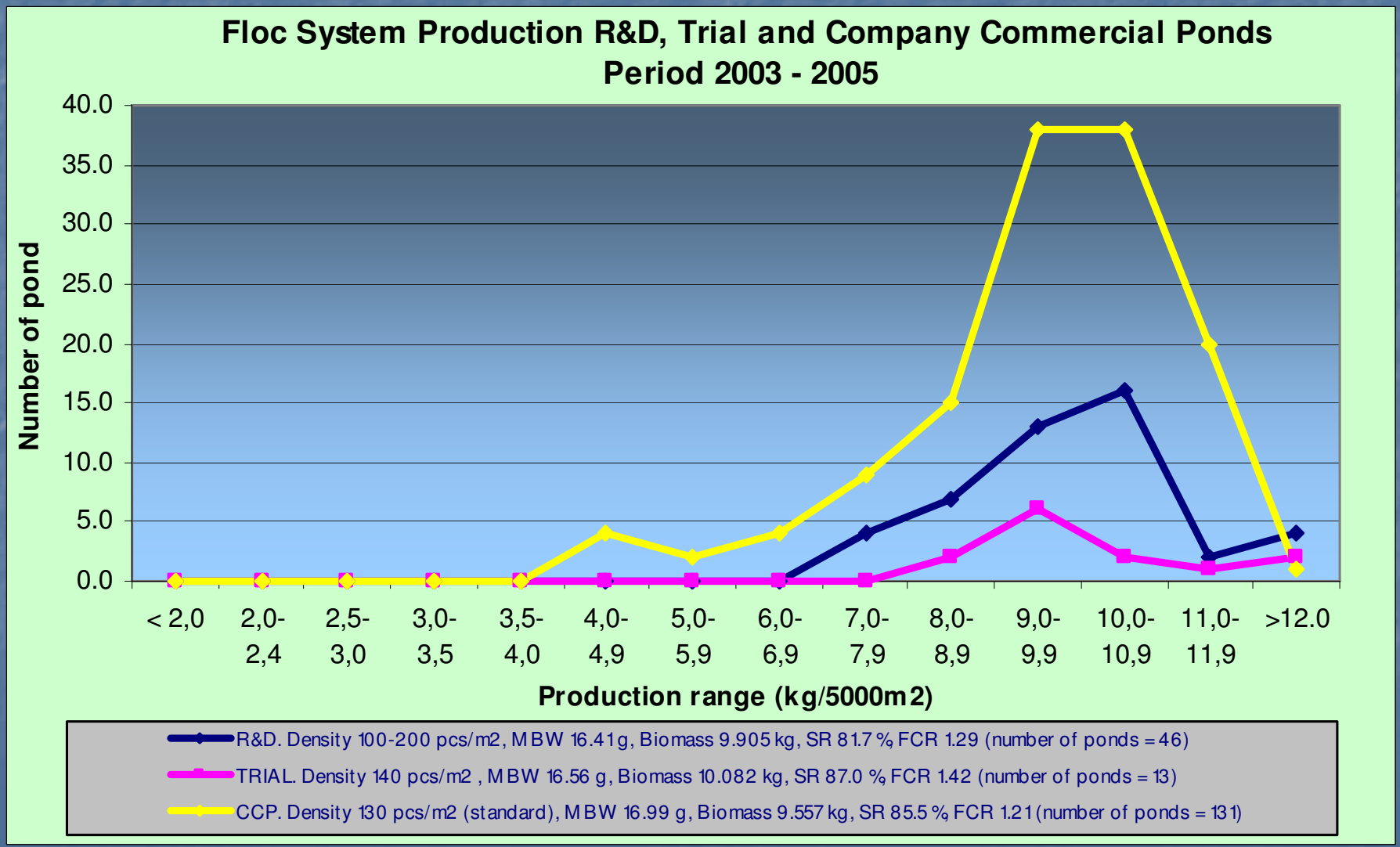
Harvest Performance of Floc System in CCP (commercial scale)

Period : October 2004-June 2005

Item	MODUL 24 CCP Normal Harvest Ponds			MODUL 26 CCP Normal Harvest Ponds		
	Min	Max	Total/Avg.	Min	Max	Total/Avg.
No. of Pond			**56**			**37**
Type of pond			**Full HDPE**			**Full HDPE**
Stocking density (pcs/m^2)	**130**	**151**	**137**	**128**	**141**	**131**
Initial Stock no. (pcs)	**650,980**	**752,820**	**682,640**	**640,530**	**705,210**	**657,306**
Period (day)	**121**	**139**	**132**	**119**	**139**	**128**
Harvest Biomass (kg)	**7,611.7**	**12,455.5**	**9,901.4**	**6,770.0**	**10,807.7**	**9,227.5**
% CV			10.17			11.64
Productivity (kg/Ha)	**15,223.5**	**24,911.0**	**19,802.8**	**13,540.0**	**21,615.3**	**18,455.0**
Harvest MBW(g)	**14.7**	**19.9**	**17.4**	**14.4**	**21.2**	**17.3**
Feed Consumption (kg)	10,822	13,379	12,120.1	9,110.0	13,110.0	11,277.6
FCR	**1.01**	**1.58**	**1.22**	**1.09**	**1.51**	**1.22**
Survival Rate (%)	**66.8**	**113.0**	**83.3**	**63.1**	**101.2**	**81.4**
Acc. ADG (g/day)	0.11	0.16	0.13	0.11	0.17	0.14
Carrying Capacity (kg/HP)	476	778	619	484	772	659
Shrimp Quality (CSD)						
Size Big (%)	**84.6**	**99.1**	**94.2**	**75.5**	**99.8**	**94.2**
Standard (%)	80.9	96.3	90.9	82.1	94.4	90.4
- Bruise (%)	1.0	17.3	5.3	1.1	38.1	10.2
- Soft Shell (%)	3.1	94.3	84.2	61.8	98.8	89.5
- Others (%)	0.0	86.0	1.9	0.0	0.7	0.3
Below Standard (%)	3.7	19.1	9.0	5.6	17.9	9.6
- Bruise (%)	0.2	6.8	1.5	3.6	60.8	16.1
- Super Soft Shell (%)	2.8	28.1	7.3	38.3	93.6	79.0
- Black Mark (%)	0.0	0.4	0.2	0.0	0.0	0.0
- Others (%)	0.0	12.0	0.6	0.3	18.1	4.6
Medium (%)	**0.6**	**11.8**	**3.8**	**0.2**	**21.5**	**4.7**
Under size (%)	**0.4**	**6.8**	**2.0**	**0.0**	**7.3**	**1.1**

Production Performance

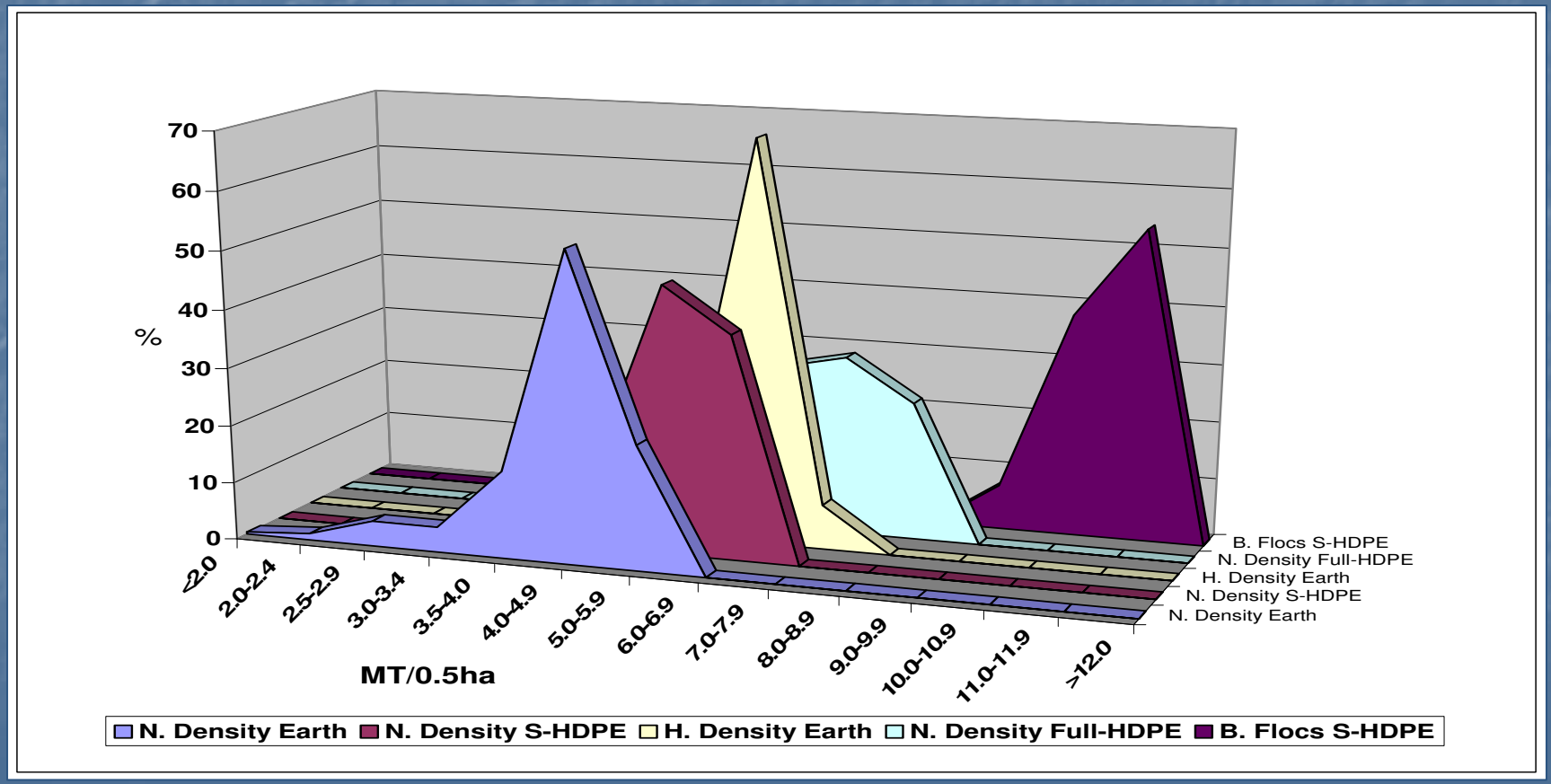
TD - R&D, Trail & Commercial



Production Efficiency

Efficiency: Increased from 9.0 MT to 21.8 MT/ ha pond.

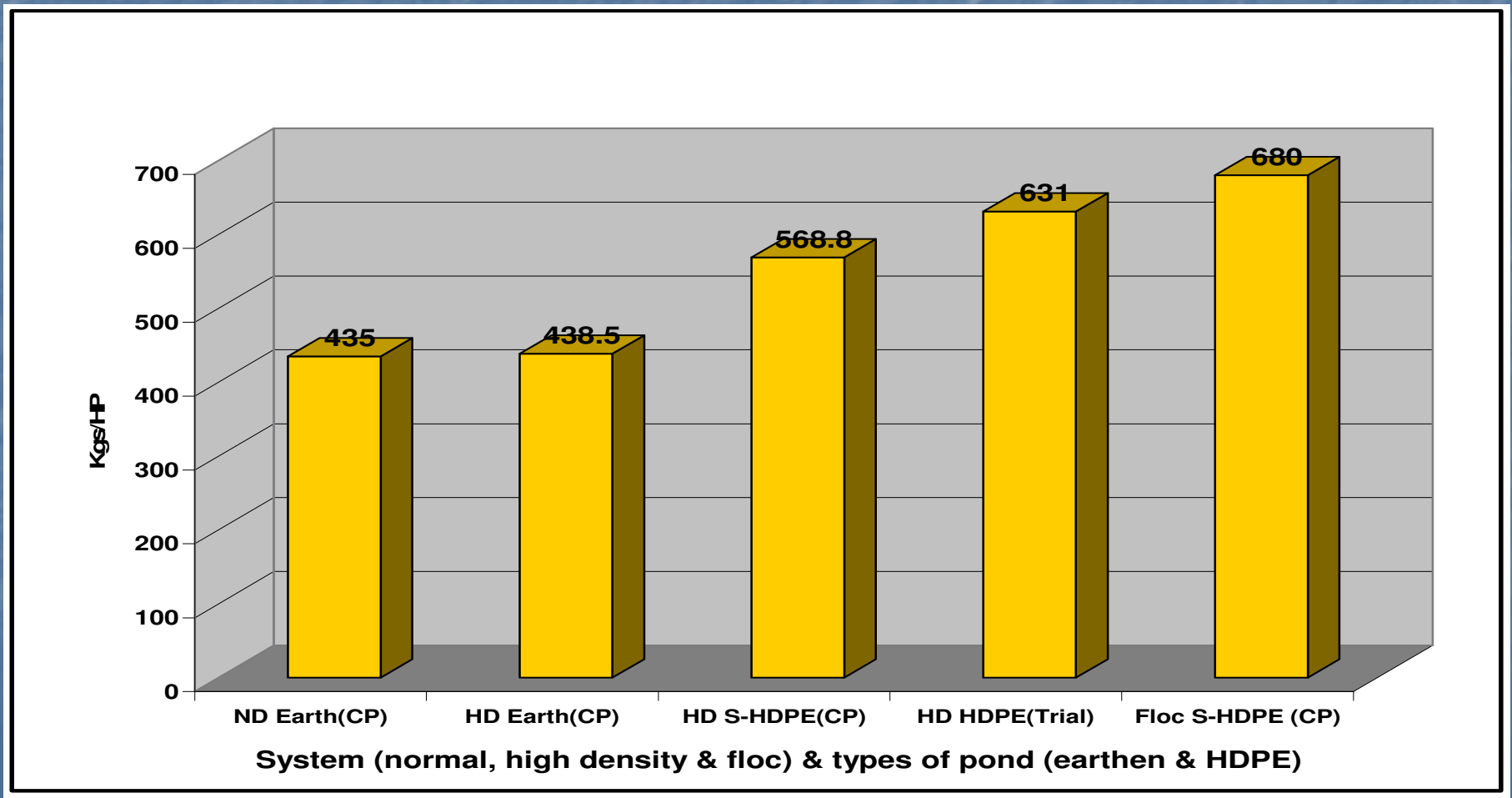
Carrying capacity: Increased from 430 kgs to 680 kgs/HP (PWA)



Rudyan Kopot & Nyan Taw (2004)

Carrying Capacity
Pond type & system (*L. vannamei*)

Increased from 430 to 680 shrimp kgs/HP (PWA)



Rudyan Kopot & Nyan Taw (2004)

Advantages/ Disadvantages

Advantages

1. **Bio-security very good (from water) – to date WSSV negative using the system.**
2. **Zero water exchange – less than 100% exchange for whole culture period.**
3. **Production (Carrying capacity): 5-10% better than normal system**
4. **Shrimp size bigger by about 2.0 g than normal system**
5. **FCR low – between 1.0 to 1.3 (without GP)**
6. **Production cost lower by around 15-20 %.**

Disadvantages

1. **High energy input – paddlewheels 28HP/ha.**
2. **Power failure critical – maximum one hour at any time (better zero hour failure)**
3. **Full HDPE lined ponds – minimum semi-HDPE lined**
4. **Technology similar but more advance – need to train technicians**

Thank you

Technology Development Team

Nyan Taw - DCD (Formally with CPB)
Saenphon Chandaeng - CPB
Slamet Sri Haryono - R&D, CPB
M. Handoyo Edi – Trial, CPB
Teguh Winarno – Commercial, CPB

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