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PARTIAL HARVEST WITH BFT, A PROMISING SYSTEM FOR PACIFIC WHITE SHRIMP

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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.

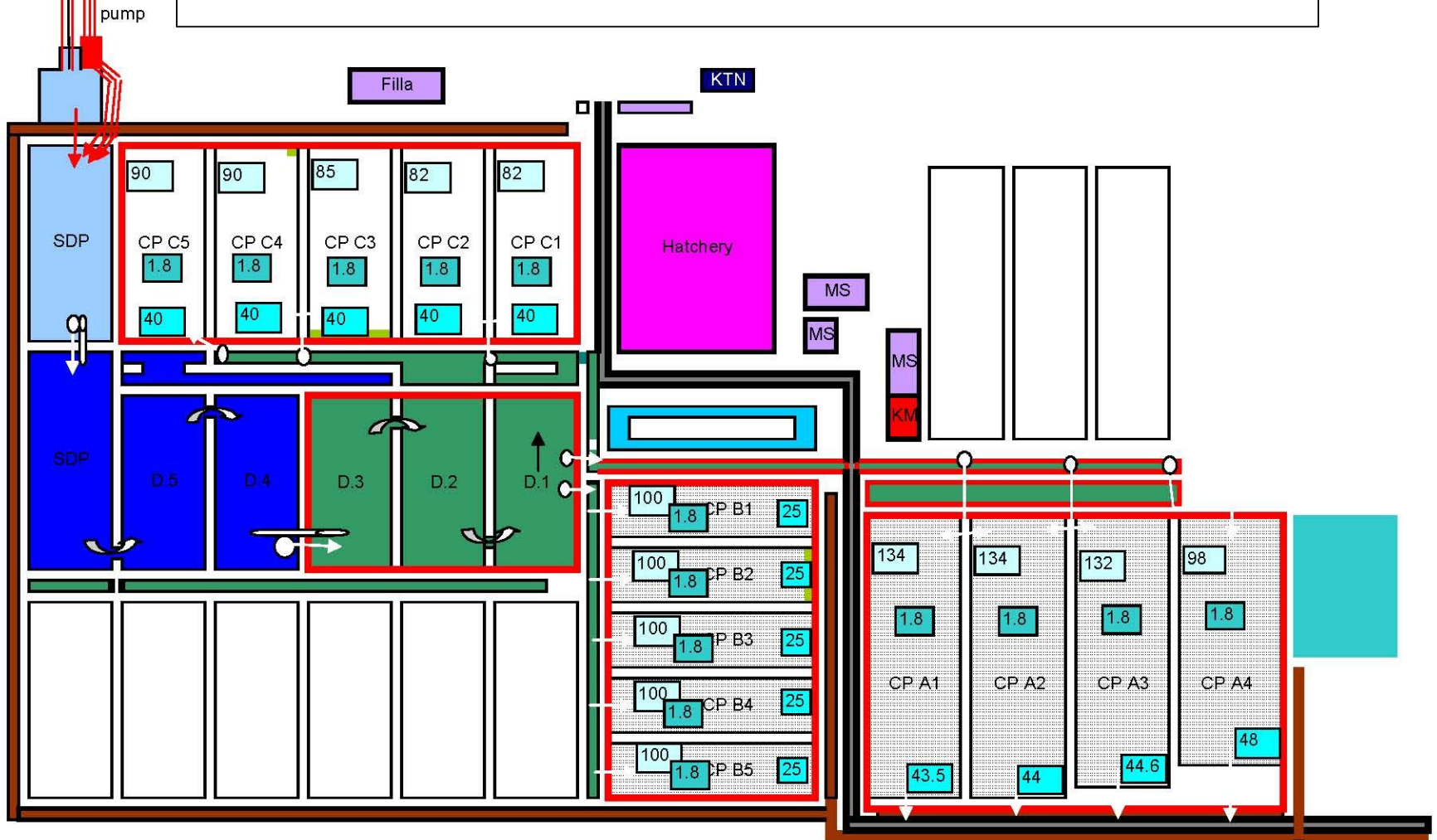
BFT (bio-floc) appears to be the solution for efficiency in terms of energy and feed utilization. The basic system of bio-floc technology was given by Avnimelech (2000, 2005a&b). The system was successfully applied in commercial culture of shrimps by McIntosh (2000a,b & c, 2001), McNeil (2000), Nyan Taw (2005, 2006), Nyan Taw & Saenphon Ch. (2005); Saenphon Ch. et.al. (2005). Most recently a study on BFT in combination with partial harvest was carried out by Nyan Taw, et. at (2008).

Indonesia

Shrimp Farm Location



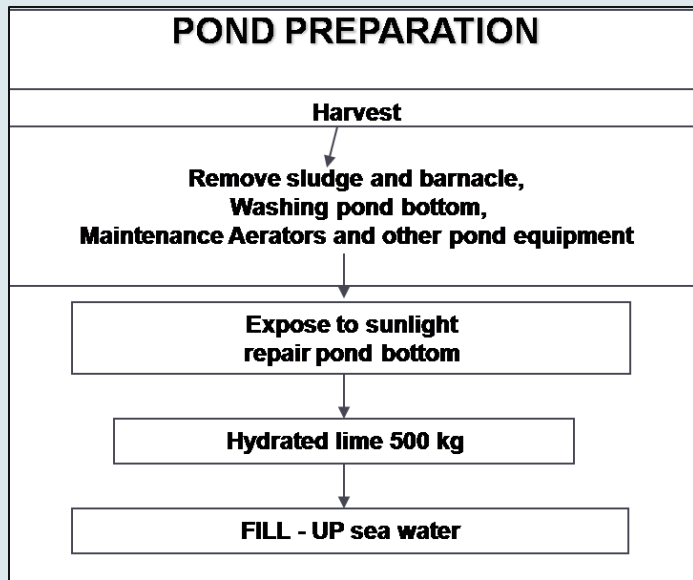
Farm Modules' Layout with Reservoirs and Culture Ponds



Farm Biosecurity

- 1. SPF Post larvae**
- 2. Module system**
- 3. HDPE lined ponds**
- 4. Control inlet & discharge gates (no leakages)**
- 5. Clean pond & equipments**
- 6. Screen & treat water**
- 7. Correct aeration system**
- 8. Crab Fence**
- 9. Bird scare lines**
- 10. Control workers & their movement**
- 11. Control visitors**

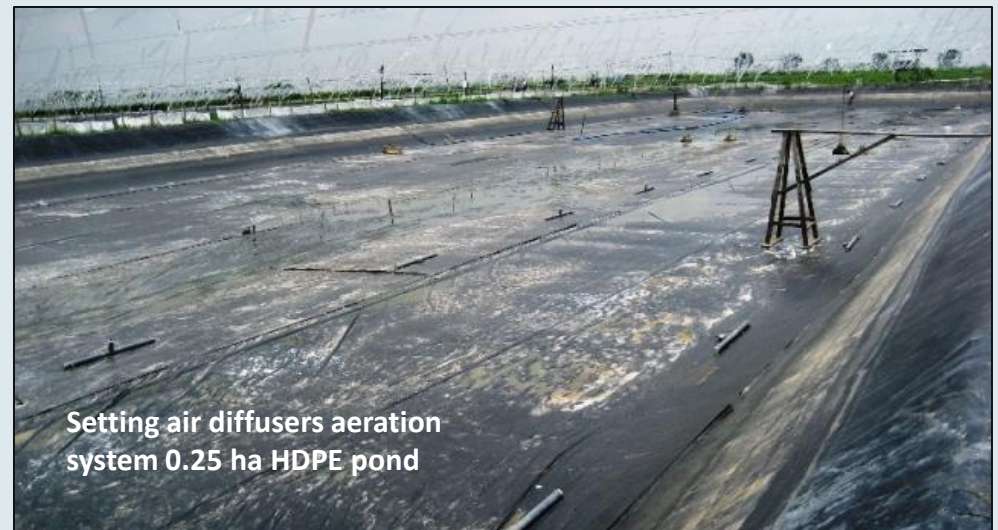
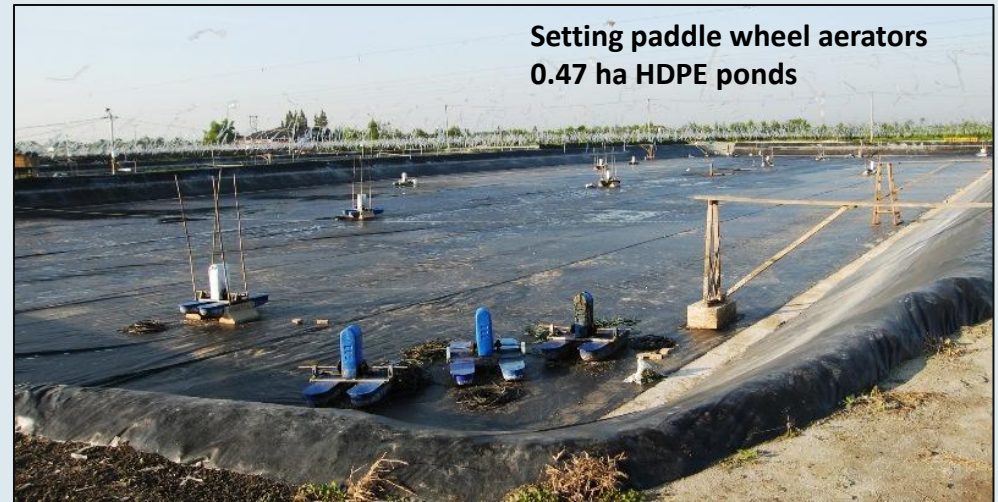
Pond Preparation



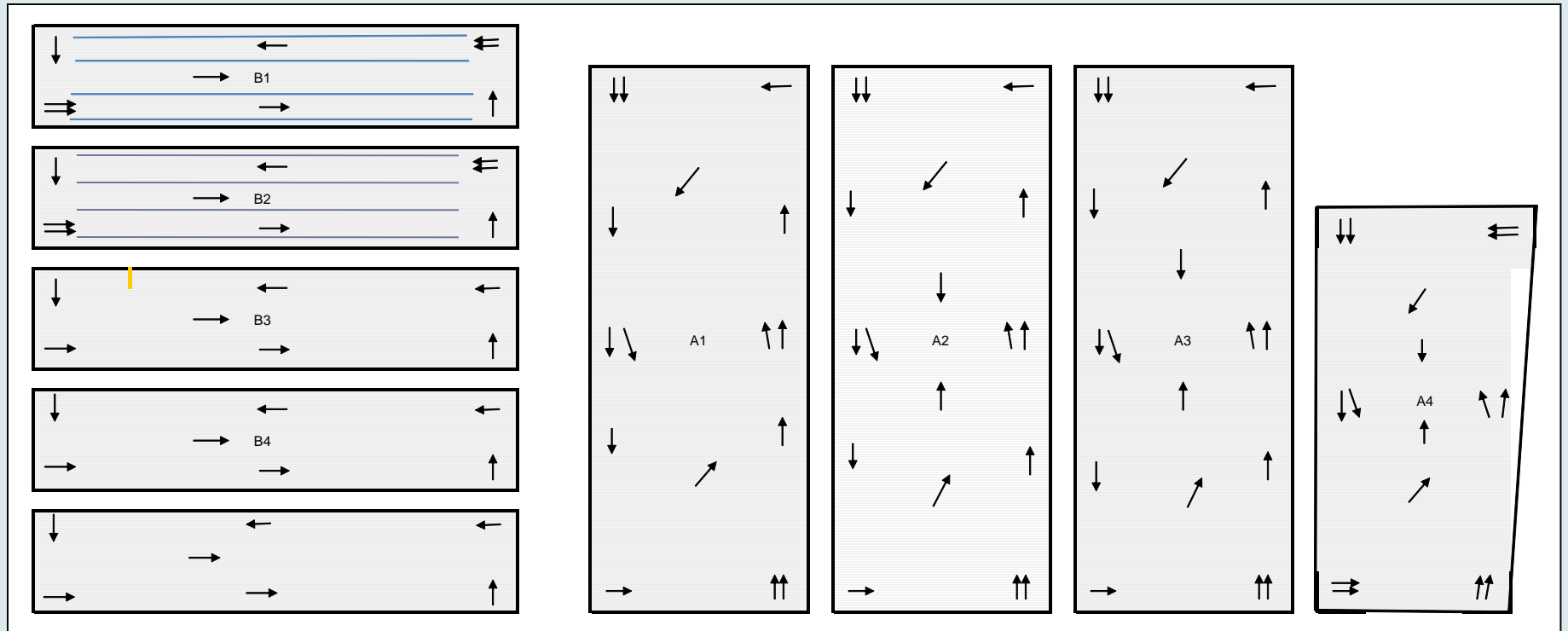
HDPE lined ponds

Placing paddle wheels in pre-determined position in pond

Placing air diffusers in pre-determined position in pond

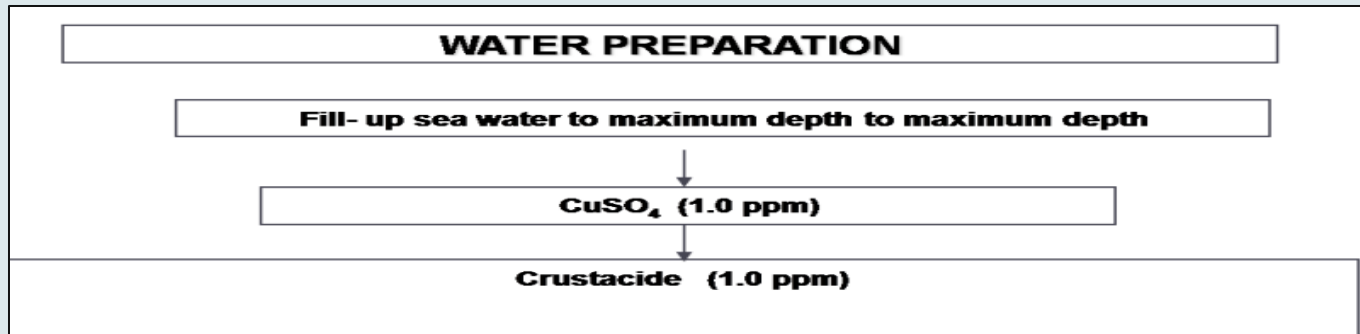


Positions - Paddle wheel aerators and air diffusers



Paddle wheels and air diffusers – set to have a circular motion of pond water to concentrate bio-floc at center of ponds. One or two paddle wheels were set directed to the center to re-suspend bio-floc to be actively suspended in the pond.

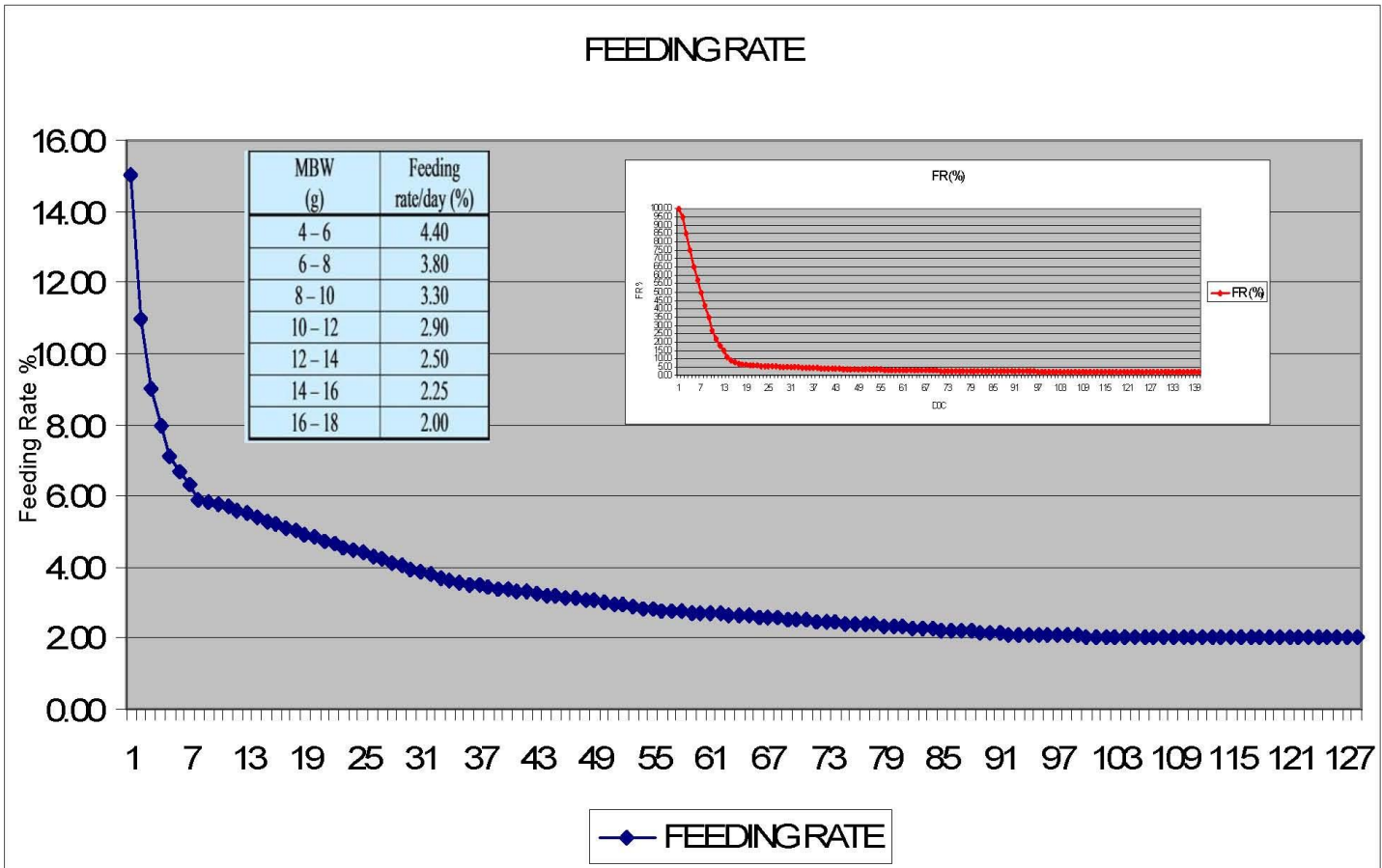
Pond Water Preparation



DAY	ACTIVITY
1st	Urea 8kg /pond, TSP 1 kg/pond Grain pellet 30 kg/pond & Dolomite 50 kg/pond
2nd	Tea Seed Cake 15 ppm
4th	Grain pellet 30 kg/pond & Dolomite 50 kg/ pond
6th	Grain pellet 30 kg/pond & Dolomite 50 kg/pond
8th	Grain pellet 50 kg/pond Molasses 8 kg/pond & Kaolin 50 kg/pond
10nd	Grain pellet 50 kg/pond Molasses 8 kg/pond
12nd	Kaolin 50 kg/pond

HDPE lined 0.5 ha production ponds

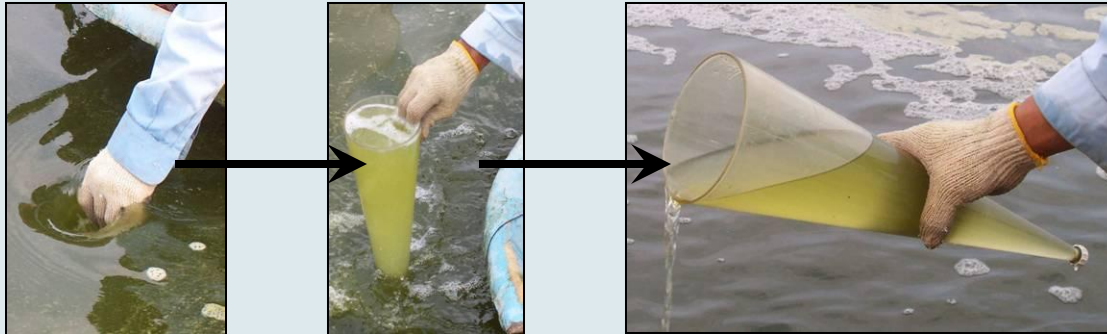
Standard Feeding Rate



Bio-floc sample

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)



Culture Operation with Biosecurity

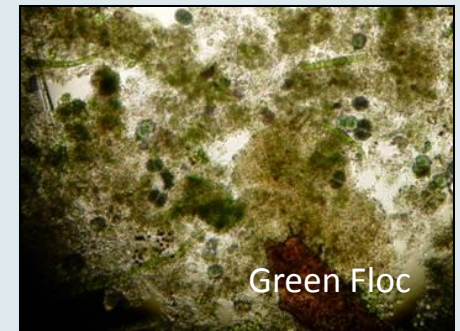
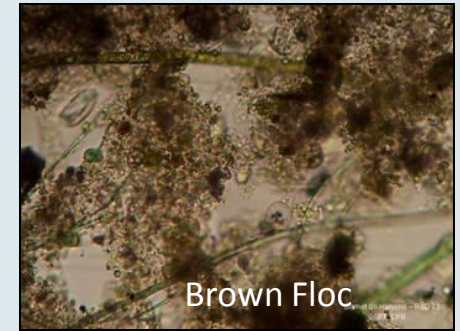


Siphoning pond bottom

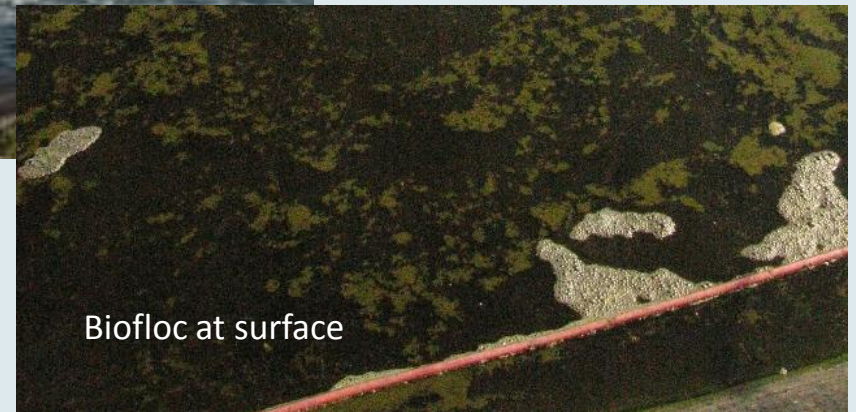
1. Paddle wheels & air diffuser positions
2. Crab fence & bird scare lines



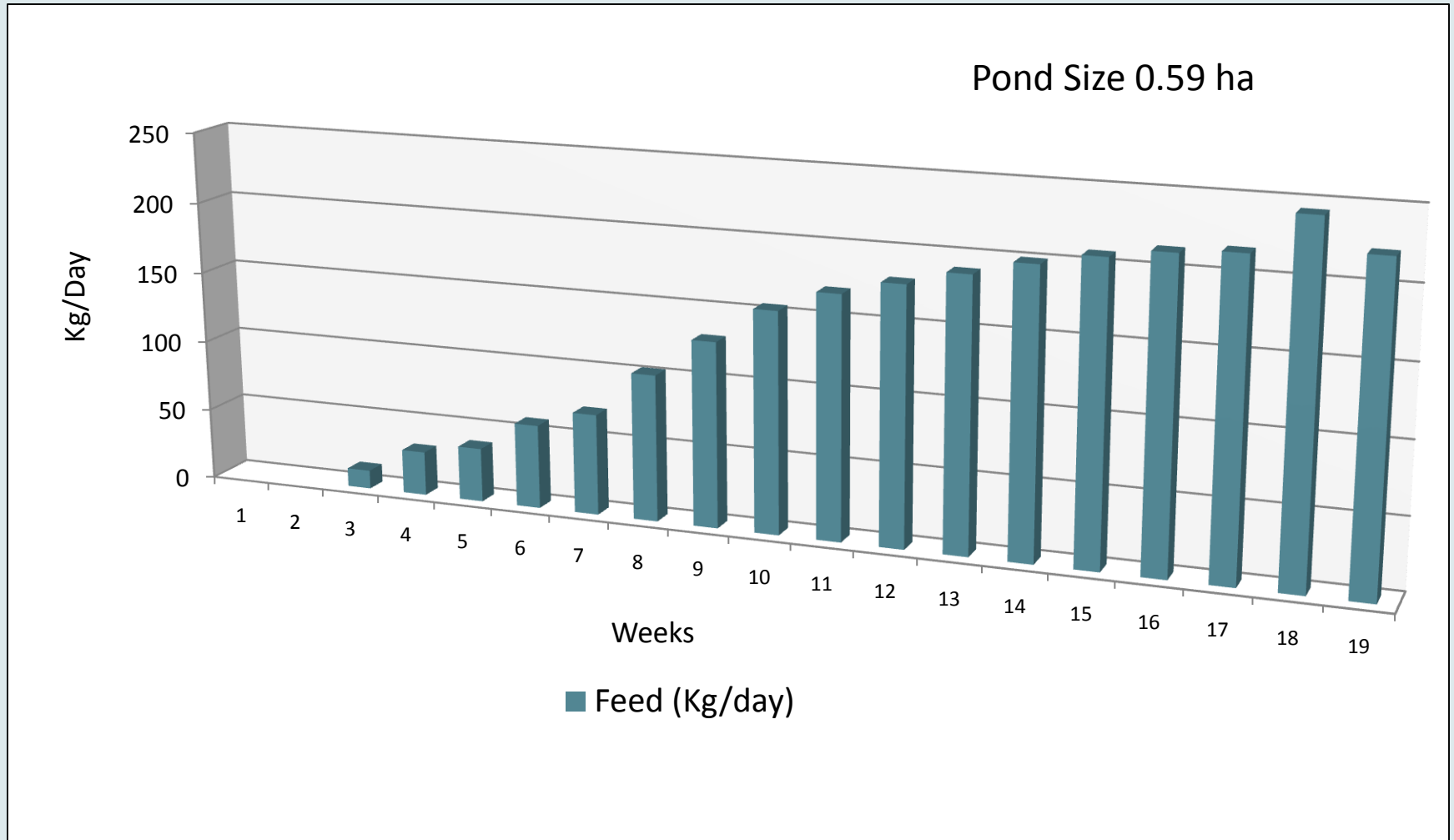
Control Biofloc



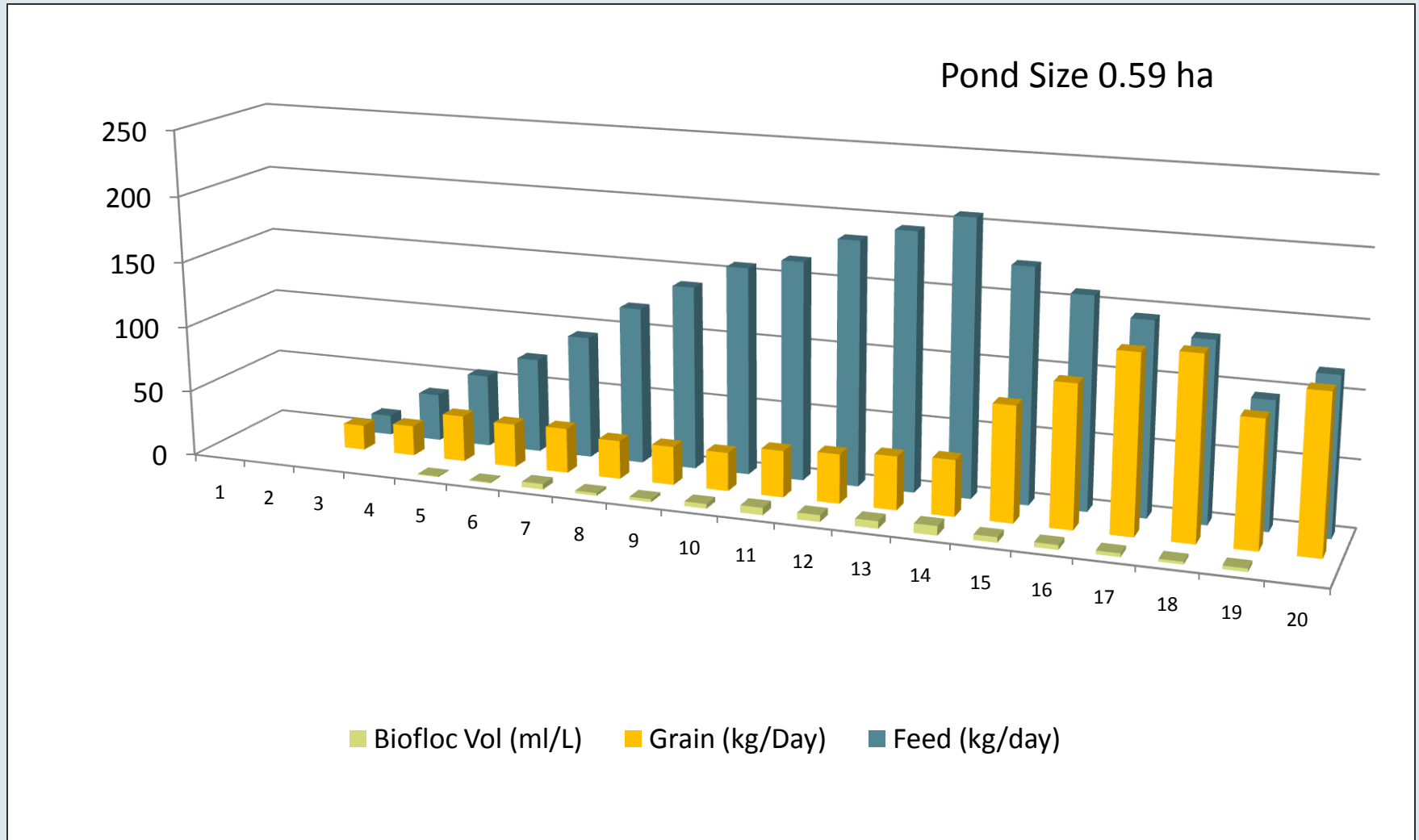
Bio-floc volume controlled at maximum 15 ml/Litre



Application of Feed - Phytoplankton

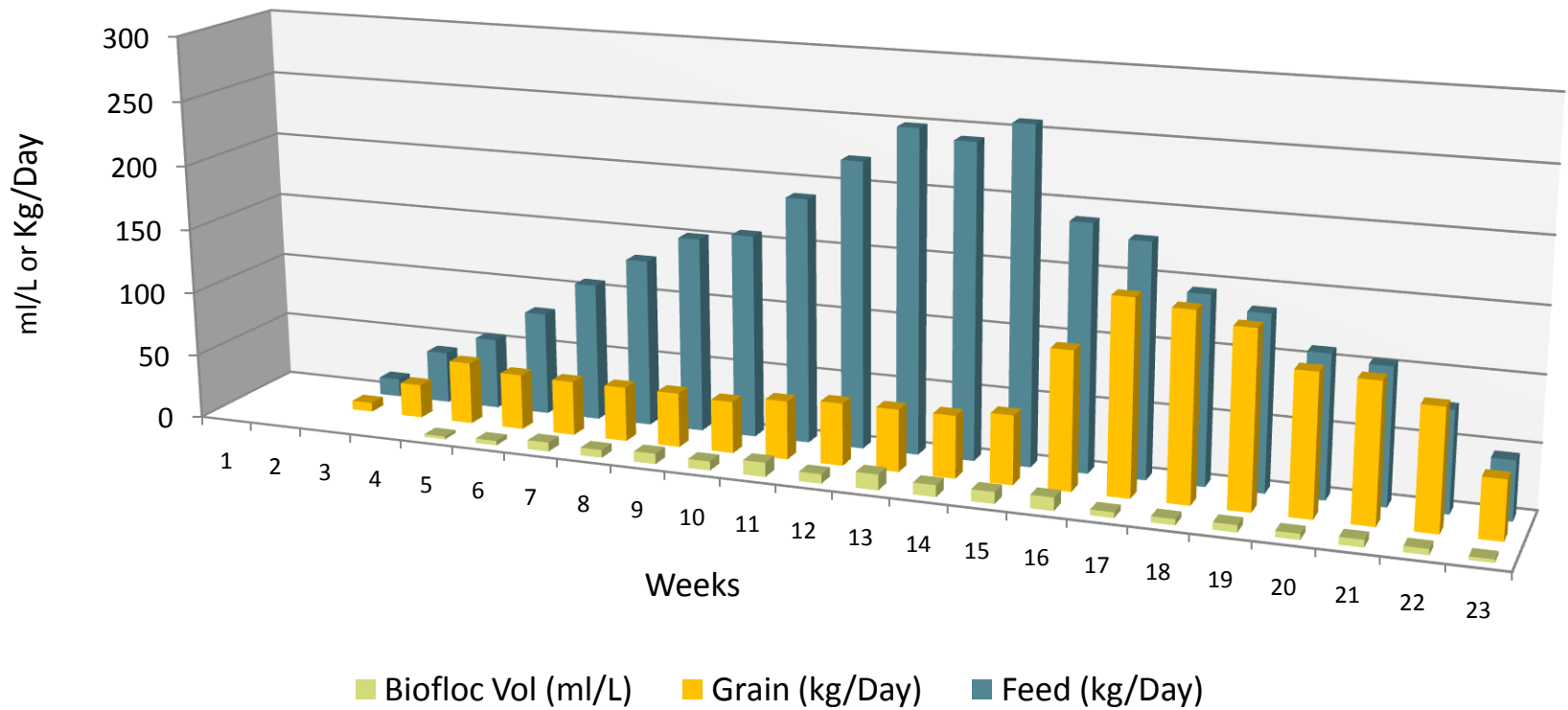


Application of Feed & Grain BFT and Biofloc control

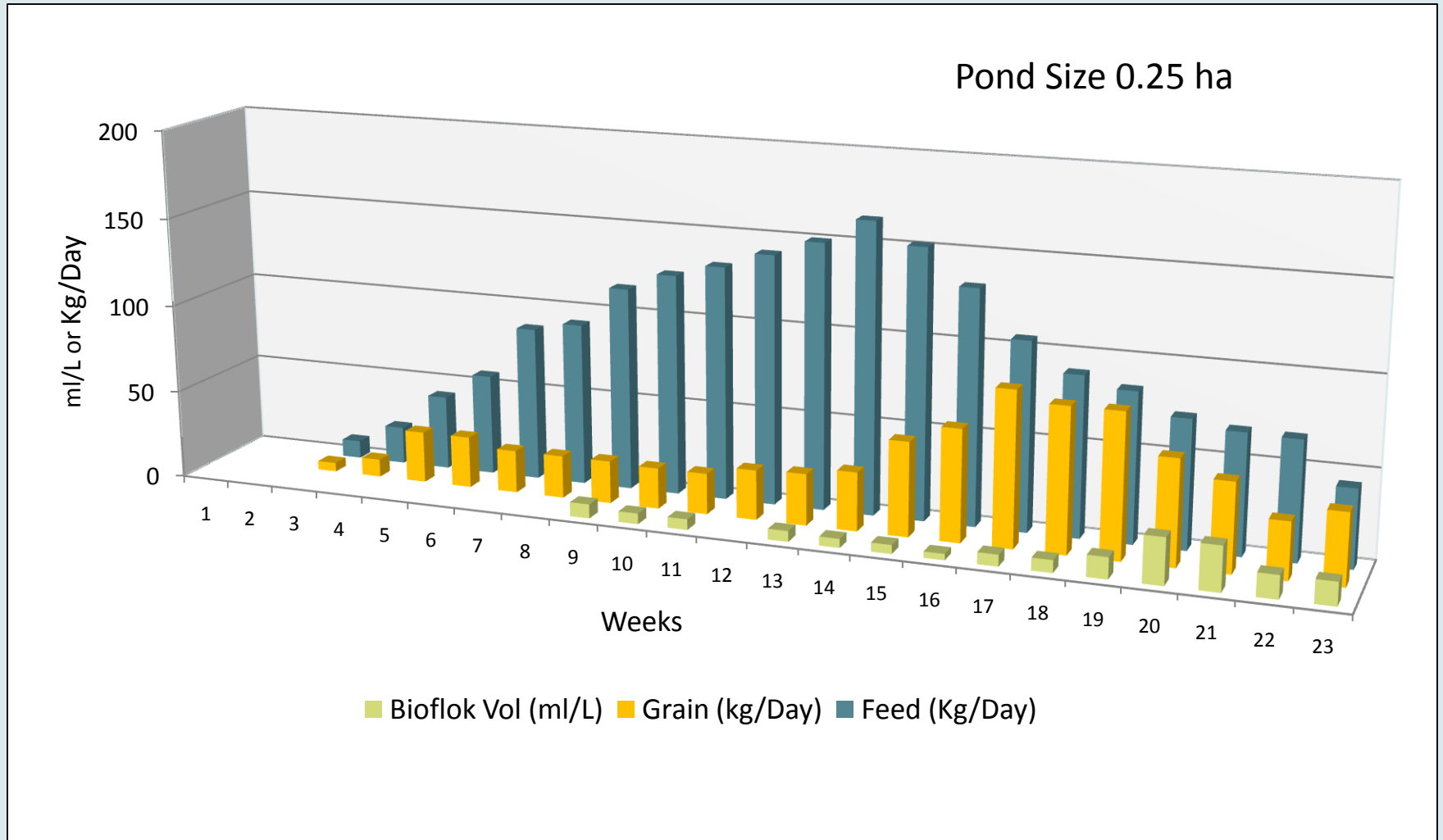


Application of Feed & Grain BFT and Biofloc control

Pond Size 0.47 ha



Application of Feed & Grain BFT and Biofloc control



Partial Harvesting with Cast Nets

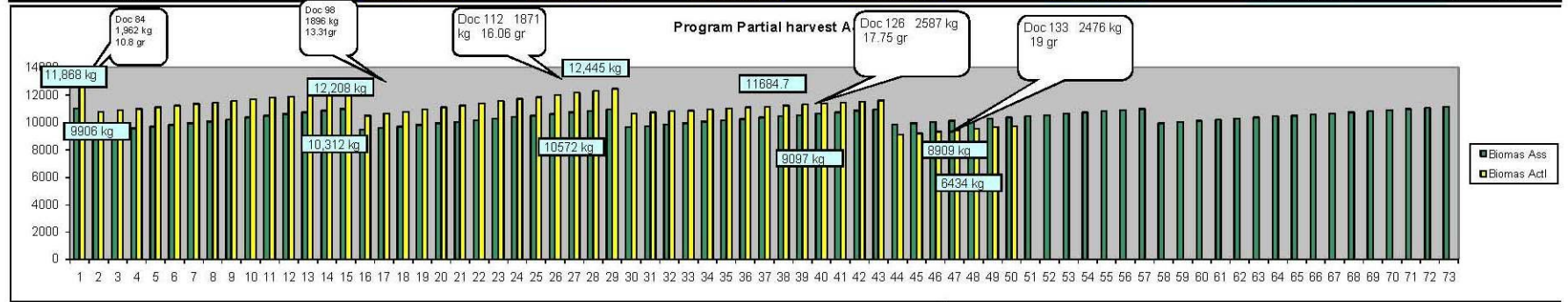


Paddle wheels & air diffusers were kept in operation during partial harvest – maximum two hours

Partial Harvests – 0.47 ha Pond

PARTIAL HARVEST PROGRAM A4

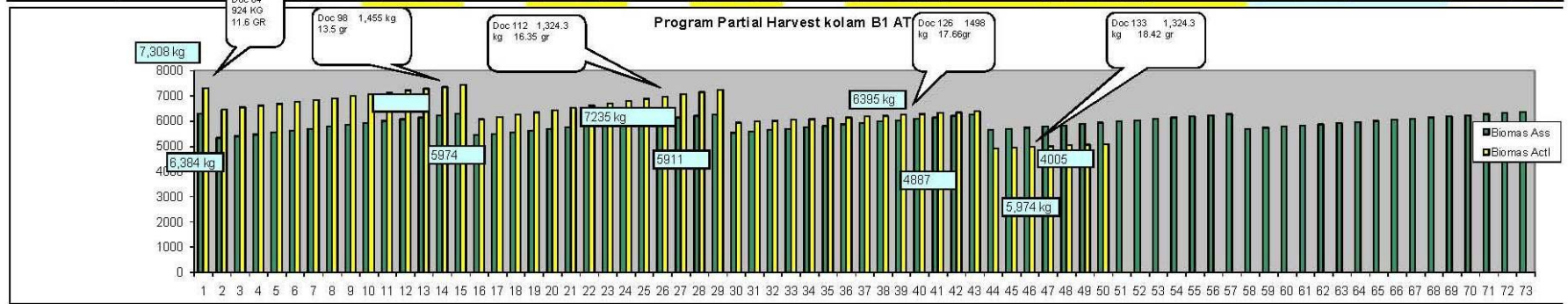
Description		Partial Harvest Program													
Pond Area	m	4740													
Stiking Density	pcs/m	257													
Initial Stok		1218180													
Aerator	hp	16													
Produktifity limit/Hp	kg/hp	650													
Final Produktifity Limit	kg/hp	1123.761908													
Produktifity Limit/Pond	kg/0.5 Ha	11511.801													
Final Produktifity Limit/Pond	kg/0.5 Ha	17980.19053													
Produktion Increase	%	6468													
Harvest		1st	1 st actl	2nd	2 nd Actl	3rd	3rd Actl	4th	4th actl	5th	Actl 5 th	final	Actl Final		total
Doc	Hari	84	84	98	98	112	112	126	126	140	133	154	155		
MBW	gr	10	10.8	12	13.31	14	16.06	16	17.75	19	19	21	21.45		
Biomass at MBW	%				0.18	0.14	0.20	0.14	0.12						
SR	Harvest	15	14.9	11	11.69	8	9.6	8	12.0	6	14.24	46.0	27.527	90.0	90
%	Remain	75	75.1	64	63.39	56	53.46	50	41.5	45	27.3	0	-0.3		
Populastion	Harvest	182727	181666.6667	133999.8	142449.2863	97454.4	116531.7559	73090.8	145785.9155	60909	173468.832	548181	335328.4086	1096362	1096362
Pcs	Remain	913635	914695.3333	779635.2	772246.0471	682180.8	655714.2912	609090	509928.3757	548181	336459.5437	0			
Biomass	Harvest	1827.27	1862	1607.998	1896	1364.362	1671.5	1169.453	2567.7	1157.271	2470.196168	11511.801	7192.794364	18638.154	17980.2
kg	Remain	9136	9879	9356	10279	9551	10531	9745	9051	10415	6393	0			
Density	Remain	192.75	192.973689	164.48	162.921107	143.92	138.3	128.5	107.5798261	115.65	71.0		71.4		
ADG			0.128571429		0.179285714	0.142857	0.196428571	0.142857	0.120714286		0.18		0.12		
Kg/hp			986.7258		1014.5		1033.6		969.9		738.6		599.4		
Size		100	92.6	83.3	75.1	71.4	62.3	62.5	56.3	52.6	47.61904762		46.6		
Harga			31800		34200.0		37700.0		41300.0		41800		45000		
Penjualan			Rp 62,391,600		Rp 64,843,200		Rp 70,555,650		Rp 106,872,010		Rp 103,254,200		Rp 335,184,217		Rp 743,100,777



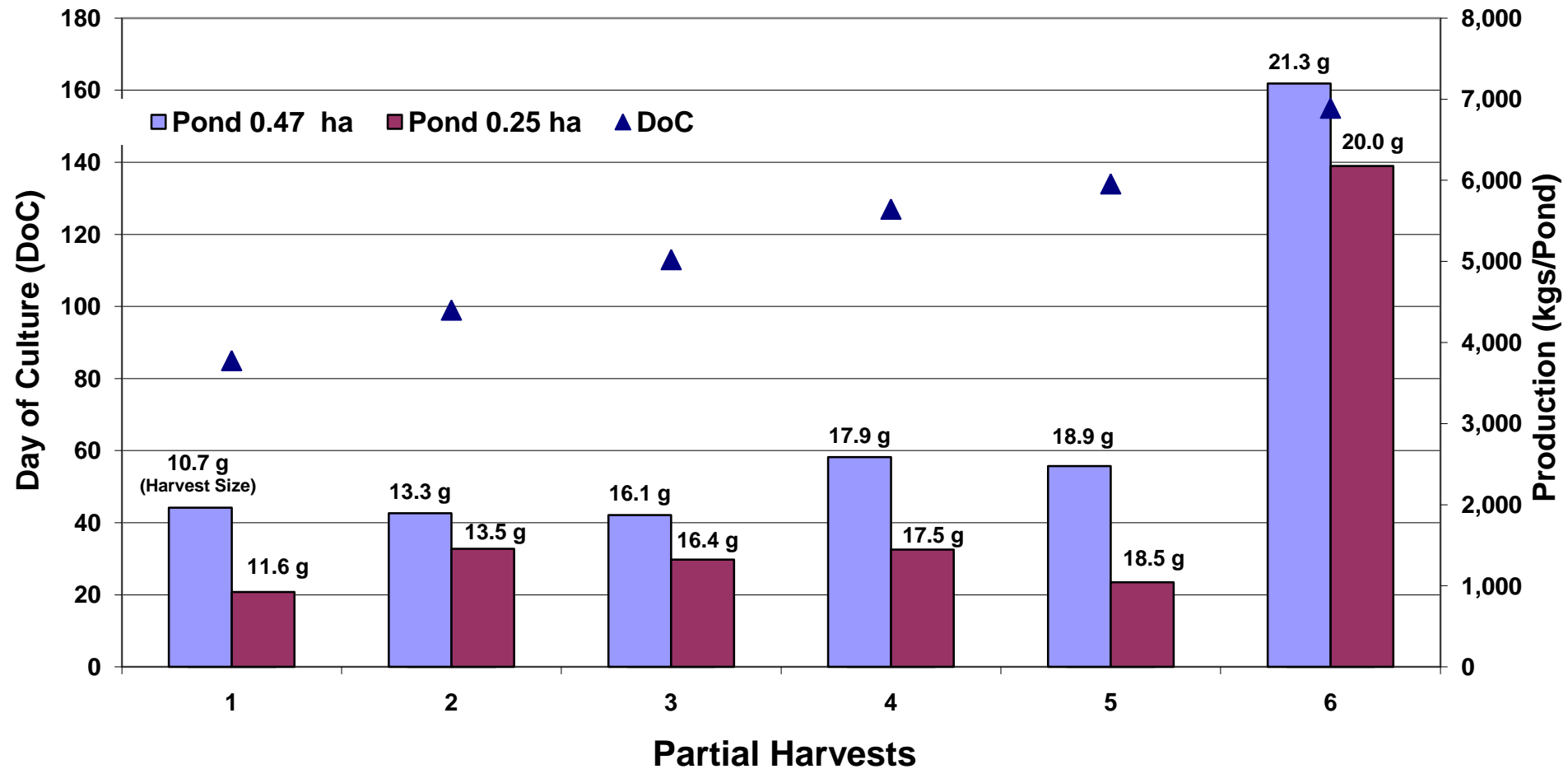
Partial Harvests – 0.25 ha Pond

PARTIAL HARVEST PROGRAM B1

Description		Partial Harvest Program													
Pond Area	m	2500													
Stiking Density	pcs/m	280													
Initial Stok		700000													
Aerator	hp	12													
Produktifity Limit/Hp	kg/hp	650													
Final Produktifity Limit	kg/hp	1034.945717													
Produktifity Limit/Pond	kg/0.5 Ha	6300													
Final Produktifity Limit/Pond	kg/0.5 Ha	12419.3486													
Produktion Increase	%	6119													
Harvest		1st	1 st actl	2nd	2 nd act	3rd	3rd Actl	4th	4th Actl	5th	Actl 5 th	final	Final ACTL	total	total Actl
Doc	Hari	84	84	98	98	112	112	126	126	140	133	154	155		
MBW	gr	10	11.6	12	13.5	14	16.35	16	17.66	18	18.42	20	20.14		
Biomass at MBW	%				0.136	0.143	0.204	0.143	0.094						
SR	Harvest	15	11.37931034	11	15.3968254	8	11.5709917	6	12.1	5	8.09	45	43.80	90	102.36
%	Remain	75	78.62068966	64	63.22386426	56	51.65287256	50	39.5	45	31.4	0	0	0	0
Populastion	Harvest	105000	78655.17241	77000	107777.7778	56000	80986.9419	42000	84824.46206	35000	56630	315000	306600	630000	716484.3541
Pcs	Remain	525000	550344.8276	448000	442567.0498	392000	361570.1073	350000	276745.6459	315000	220116	0	0	0	0
Biomass	Harvest	1050	823	924	1452	784	1324	673	1498	630	1043.1246	6300	6174.924	10360	12419.3486
kg	Remain	5250	6384	5376	5974.7	5488	5911.7	5600	4887.328106	5670	4055	0	0	0	0
Density		210	220.137931	179.2	177.0268198	156.8	144.6280432	140	110.6982583	126	88.0	0	0	0	0
ADG			0.138095238		0.135714286	0.142857	0.203571429	0.142857	0.093571429		0.054285714		0.122857143		
Kg/Hp			532		497.887931		492.638272		407.2773421		337.8775164		0		0
Size			609		619.1		603.0		532.1		424.8		514.8		1034.9
Harga			31800		34200.0		37700.0		41200.0		43000		42000		45000
Penjualan			Rp 29,383,200		Rp 49,761,000		Rp 49,926,110		Rp 61,717,600		Rp 43,185,358		Rp 277,871,580		Rp 511,844,848



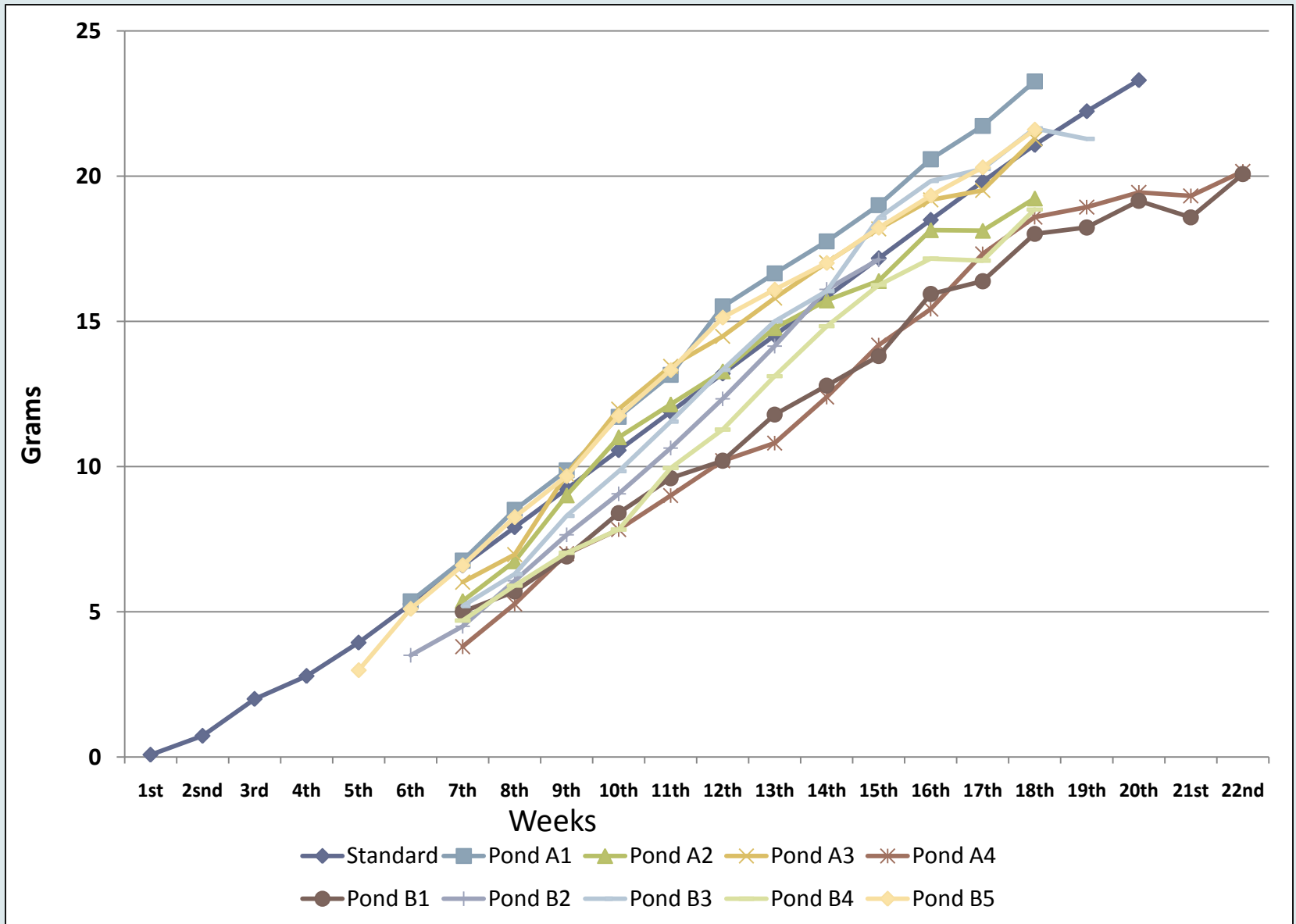
Partial Harvest Performance with Bio Floc Technology



Environment (Pond water quality)

• Dissolved Oxygen (DO)	3.7 – 5.3
• pH	7.0 – 8.4
• Salinity (ppt)	20.0 – 35.0
• Temperature (C)	27 – 31
• Total Alkalinity	80 – 156
• Total Ammonia Nitrogen (TAN)	0.5 – 2.5

Growth



Harvest Performance Summary ATP Sei Buluh

Periode : april 2007 - Agustus 2008

Description	Average			Total Average
	Flush Out DOC < 43	PD DOC 43 - 104	PN DOC > 104	
Number of Pond			9	9
Pond Size (M ²)			3748.2	3748.2
PL Source (Hatchery/Nursery)			KPP / ATP	KPP / ATP
Pond Type			FULL HDPE	FULL HDPE
Number of PWA			13.30	13.30
Stocking Density(Pls/m ²)			182.80	182.80
DOC			123.40	123.40
SR (%)			84.35	84.35
MBW Actual Harvest (gr)			20.43	20.43
FCR Pellet			1.24	1.24
ADG (gr)			0.16	0.16
Productivity (Kg/Pond)			10430.56	10430.56
Productivity (Kg/Ha)			27878.78	27878.78
Productivity/Power Input (Kg/hp)			763.22	763.22
Tot. Production			93,875	93,875

Harvest Performance

Performa Panen berdasarkan Densitas Tebar
Pond Base Blok ATP Farm Sei Buluh Siklus I

Keterangan	Alamat Tambak									
	Kolam A1	Kolam A2	Kolam A3	Kolam A4	Kolam B1	Kolam B2	Kolam B3	Kolam B4	Kolam B5	Total Average
Ukuran Tambak (M ²)	5896	5896	5986	4704	2500	2500	2500	2500	2500	3886.888889
Tipe Tambak	FULL HDPE	FULL HDPE	FULL HDPE	FULL HDPE	FULL HDPE	FULL HDPE	FULL HDPE	FULL HDPE	FULL HDPE	FULL HDPE
Benur	NP PT. KPP	NP PT. KPP	NP PT. KPP	NP PT. KPP	NP PT. KPP	KPP	NP PT. KPP	NP PT. KPP	ATP	
Jumlah kincir	16	18	18	16	12	12	10	12	7	13.44
Stoking Density	100	145	146	257	280	200	145	145	130	172.00
DOC	127	131	130	155	155	105	127	130	132	132.44
SR (%)	75.72	84.07	80.95	86.54	102.15	64.84	86.35	100.8	77.7	84.35
MBW actual harvest (gr)	23.26	19.23	21.15	21.45	20.14	17.12	21.37	18.52	21.6	20.43
FCR Pellet	1.6	1.2	1.14	1.12	1.11	1.38	1.10	1.1	1.38	1.24
ADG	0.18	0.15	0.16	0.14	0.13	0.16	0.17	0.14	0.16	0.16
Produktivitas (kg/pond)	11,461	13,508	14,386	17,983	12,371	5550	6545	6615	5456	10430.56
Produktivitas (kg/Ha)	19,439	22,910	24,219	38,229	49,448	22,200	26,180	26460	21,824	27878.78
Produktivitas/Power Input (kg/hp)	720	739	807	1124	1031	463	655	551	779	763.22

P. vannamei



Thank you

Nyan Taw

BlueArchipelago
Quality | Safety | Ecology

References

- Avnimelech, Yoram 2000. Nitrogen control and protein recycle. Activated suspension pond. ***The Advocate*** April 23-24
- Avnimelech, Yoram 2005a. Tilapia harvest microbial flocs in active suspension research pond. ***Global Aquaculture Advocate*** V 8 (5), 57-58
- Avnimelech, Yoram, 2005b Feeding of Tilapia on microbial flocs: Quantitative evaluation using material balances. Paper presented at ***World Aquaculture 2005***, May 9-13, Nusa Dua, Bali, Indonesia. Book of Abstracts, 57
- McIntosh, Robin P., 2000a Changing paradigms in shrimp farming. III Pond design and operation consideration ***The Advocate*** February 42-45
- McIntosh, Robin P. , 2000b Changing paradigms in shrimp farming. IV Low protein feeds and feeding strategies. ***The Advocate*** April 44-50
- McIntosh, Robin P., 2000c Changing paradigms in shrimp farming. V Establishment of heterotrophic bacterial communities ***The Advocate*** December 52-54
- McIntosh, Robin P., 2001, Changing paradigms in shrimp farming. V Establishment of heterotrophic bacterial communities ***The Advocate*** February 52-58
- McNeil, Roberick, 2000, Zero exchange, aerobic, heterotrophic systems: Key considerations. ***The Advocate*** June 72-76
- Nyan Taw, 2005a. Shrimp Farming in Indonesia: Evolving industry responds to varied issues. ***Global Aquaculture Advocate*** V 8 (4), 65 – 67
- Nyan Taw, 2005b. Indonesia shrimp production. Paper presented at ***World Aquaculture 2005***, May 9-13, Nusa Dua, Bali, Indonesia. Book of Abstracts, 644.
- Nyan Taw & Saenphon Chandaeng, 2005. The role of R&D and commercial trials on efficiency and productivity of large integrated shrimp farm. Paper presented at ***World Aquaculture 2005***, May 9-13, Nusa Dua, Bali, Indonesia. Book of Abstracts, 643.
- Nyan Taw, 2006, Shrimp production in ASP system, CP Indonesia: Development of the technology from R&D to commercial production. Paper presented at ***Aquaculture America 2006*** Las Vegas, USA February 2006
- Nyan Taw, Hendri Fuat, Naira Tarigan & Kaesar Sidabutar. 2008, Partial harvest/ biofloc system: Promising for Pacific white shrimp. ***Global Aquaculture Advocate*** September/October 84-86
- Saenphon Chandaeng, Nyan Taw, M. Handoyo Edi & Agung Gunawan, 2005. Culture trails on production potential of *L. vannamei* in heterotrophic (bacteria floc) system. Paper presented at ***World Aquaculture 2005***, May 9-13, Nusa Dua, Bali, Indonesia. Book of Abstracts, 112.