World Aquaculture 2009

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

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Introduction

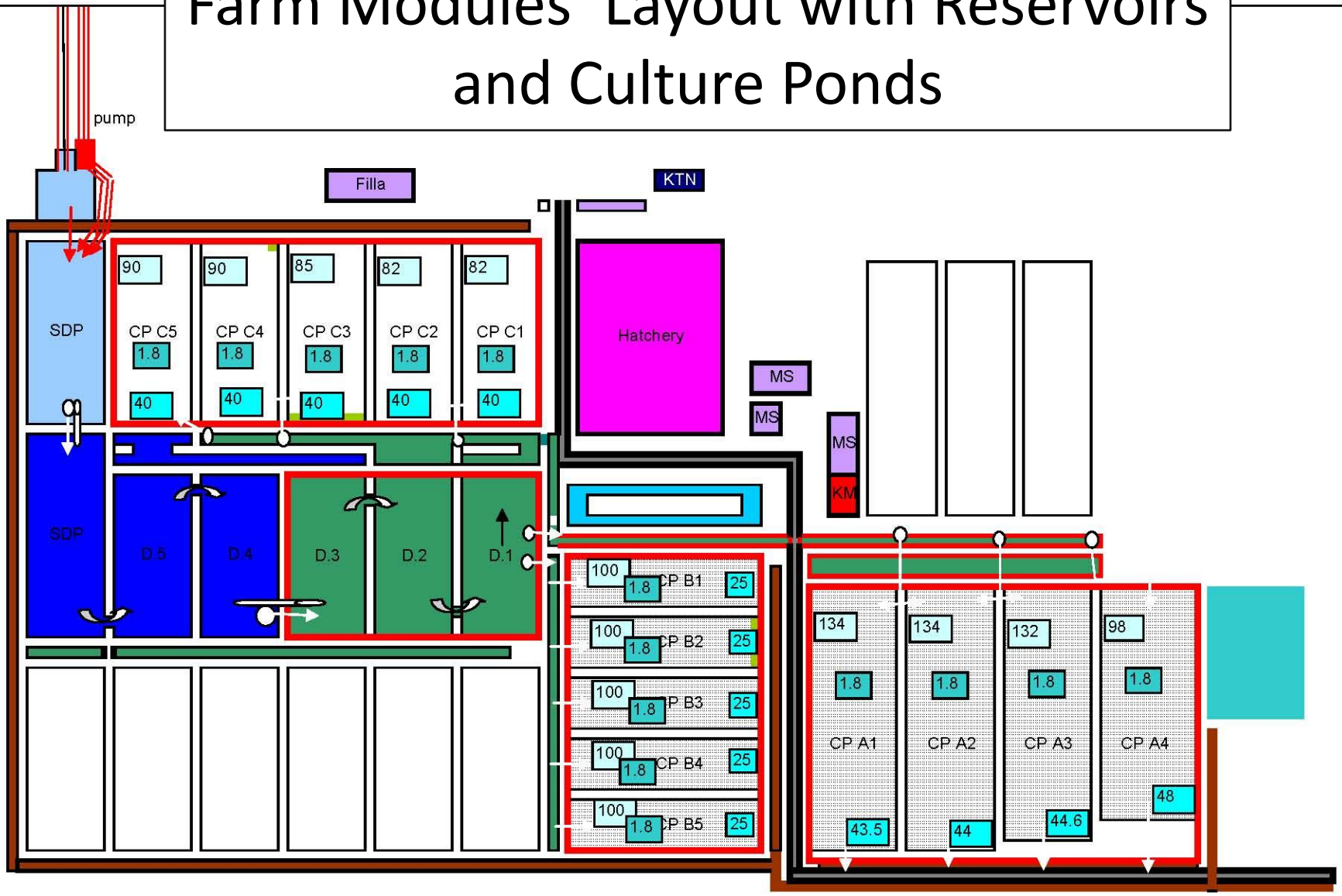
Shrimp farming has become competitive and as such the technology utilized needs to be efficient in all aspects – productivity, quality, sustainability, bio-security and to be in line with market demand.

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



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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

POND PREPARATION

Harvest

↓

Remove sludge and barnacle,
Washing pond bottom,
Maintenance Aerators and other pond equipment

↓

Expose to sunlight
repair pond bottom

↓

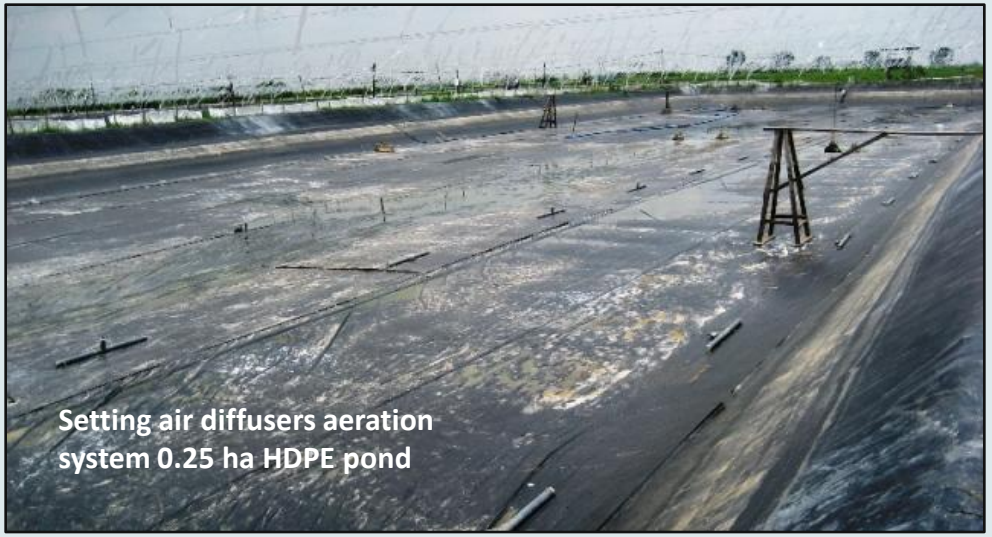
Hydrated lime 500 kg

↓

FILL - UP sea water

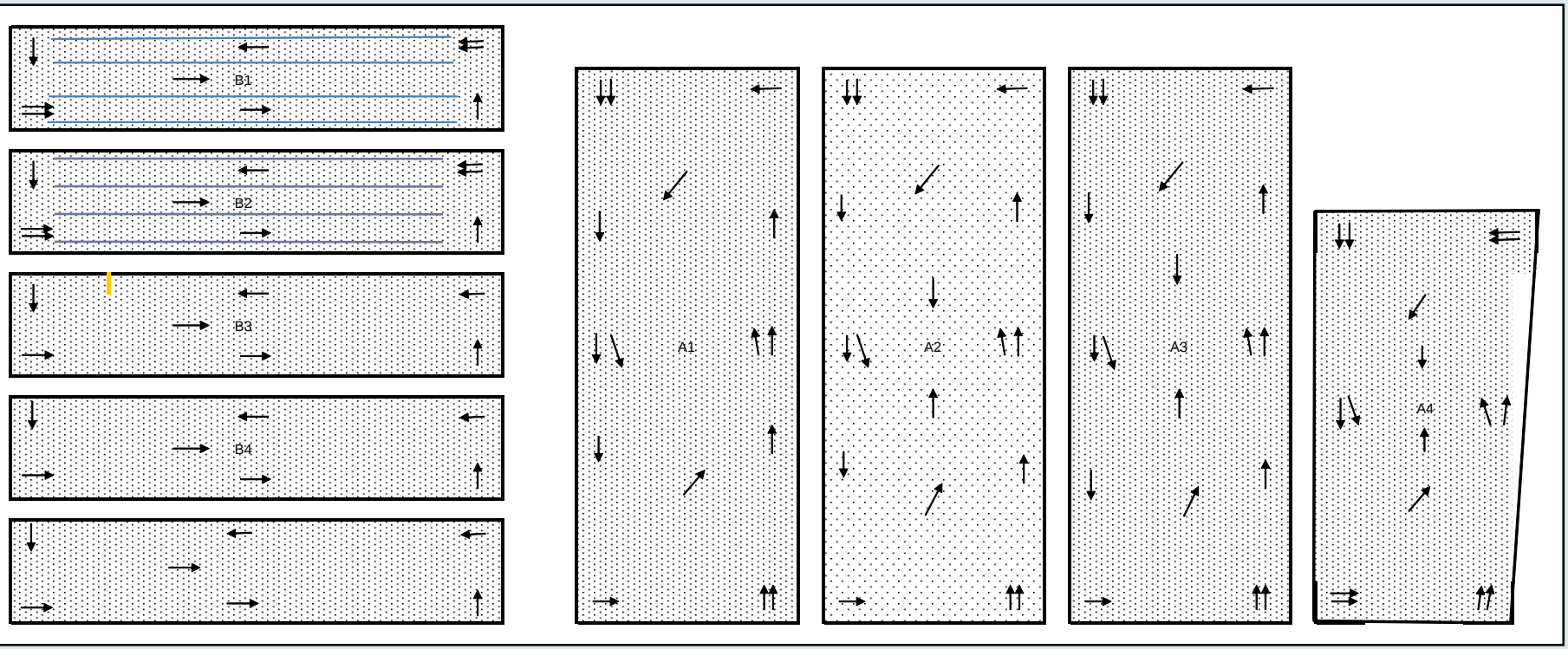
HDPE lined ponds
Placing paddle wheels in pre-determined position in pond
Placing air diffusers in pre-determined position in pond

Setting paddle wheel aerators 0.47 ha HDPE ponds



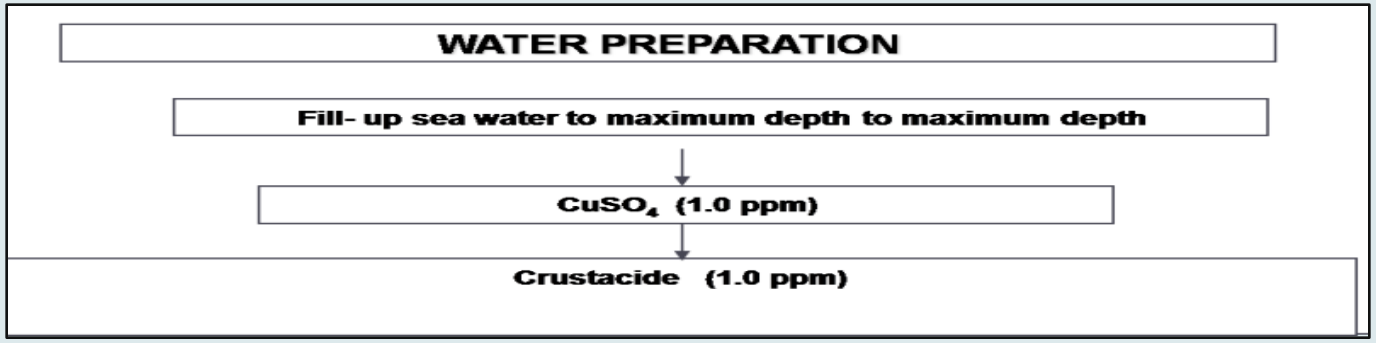
Setting air diffusers aeration system 0.25 ha HDPE pond

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.

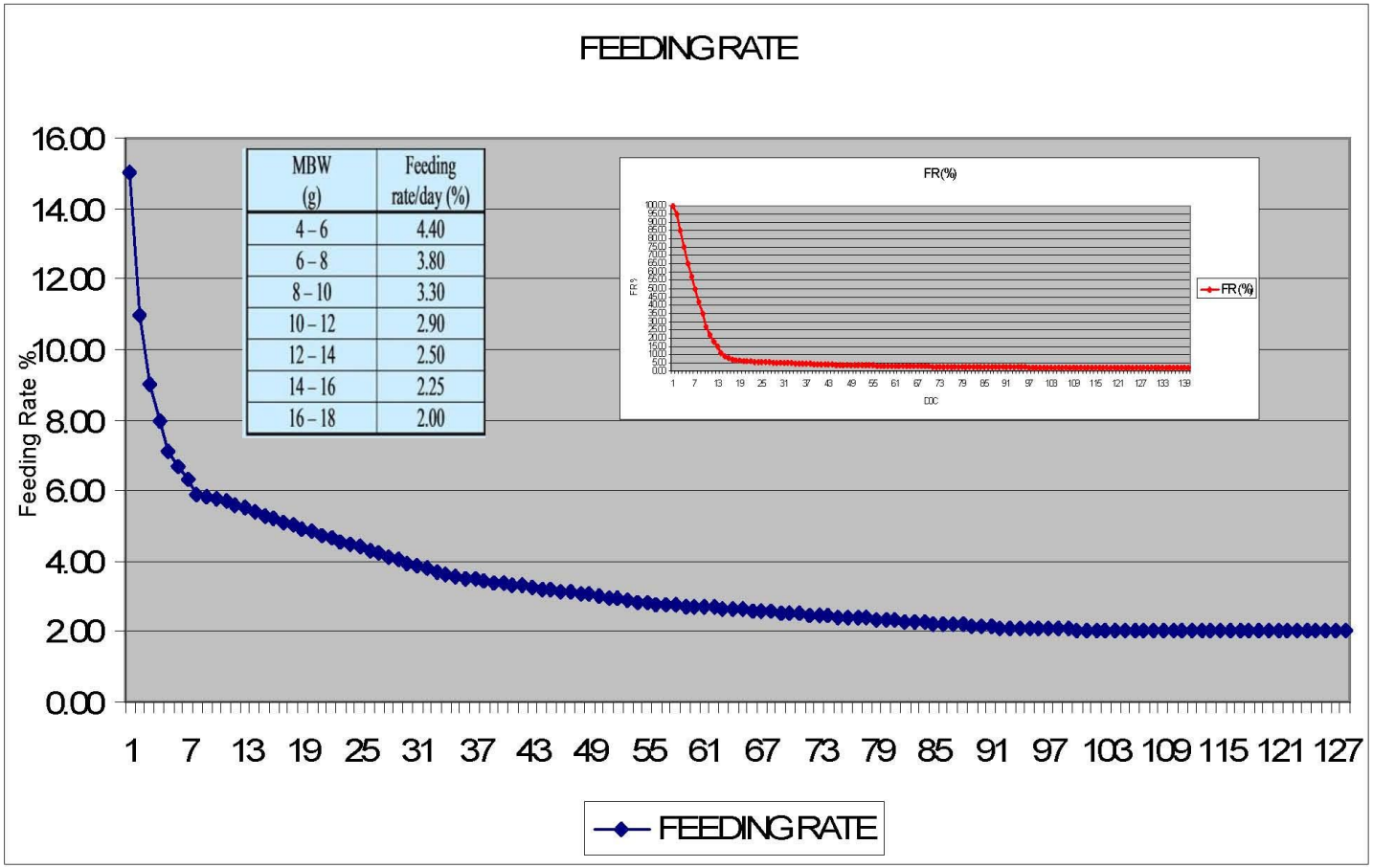
Pond Water Preparation



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

HDPE lined 0.5 ha production ponds

Standard Feeding Rate

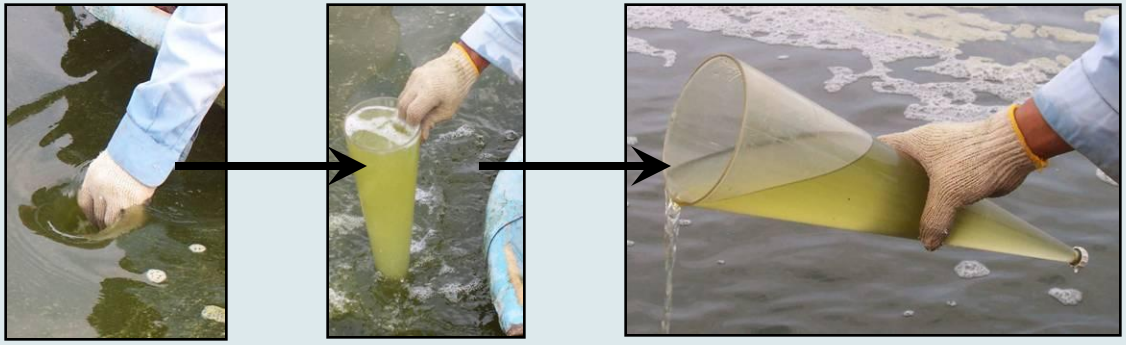


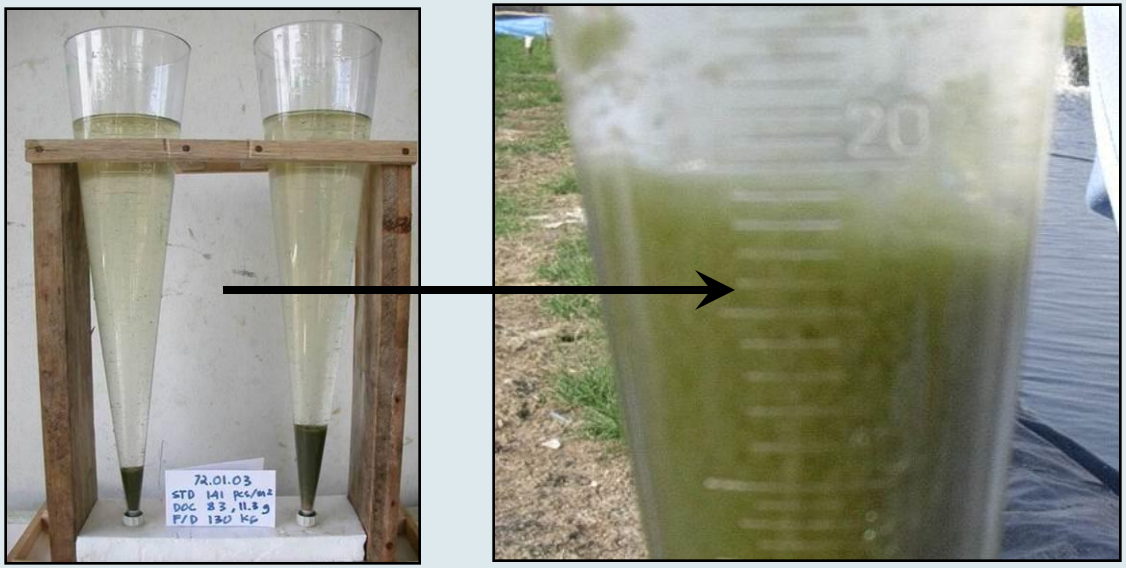
MBW (g)	Feeding rate/day (%)
4 – 6	4.40
6 – 8	3.80
8 – 10	3.30
10 – 12	2.90
12 – 14	2.50
14 – 16	2.25
16 – 18	2.00

Bio-floc sample

Measuring procedure

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





Let it settled for 15-20 minutes

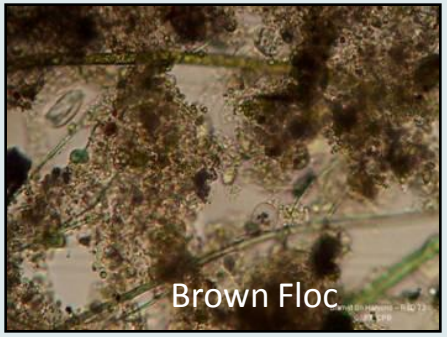
Read density of flocs in cone (ml/l)

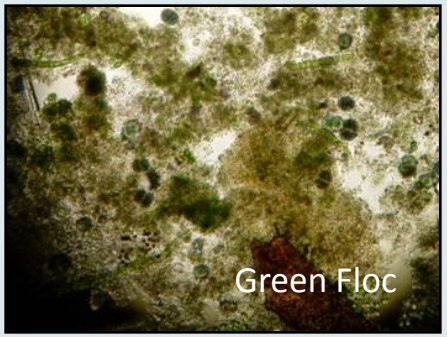
Culture Operation with Biosecurity

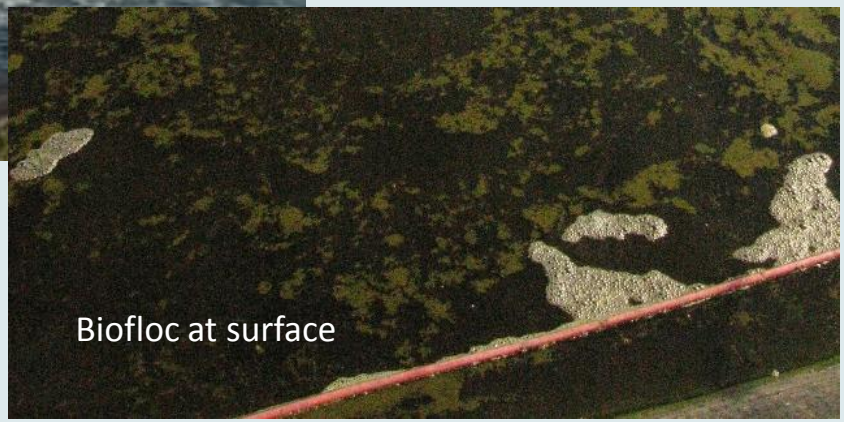
1. Paddle wheels & air diffuser positions
2. Crab fence & bird scare lines

Control Biofloc

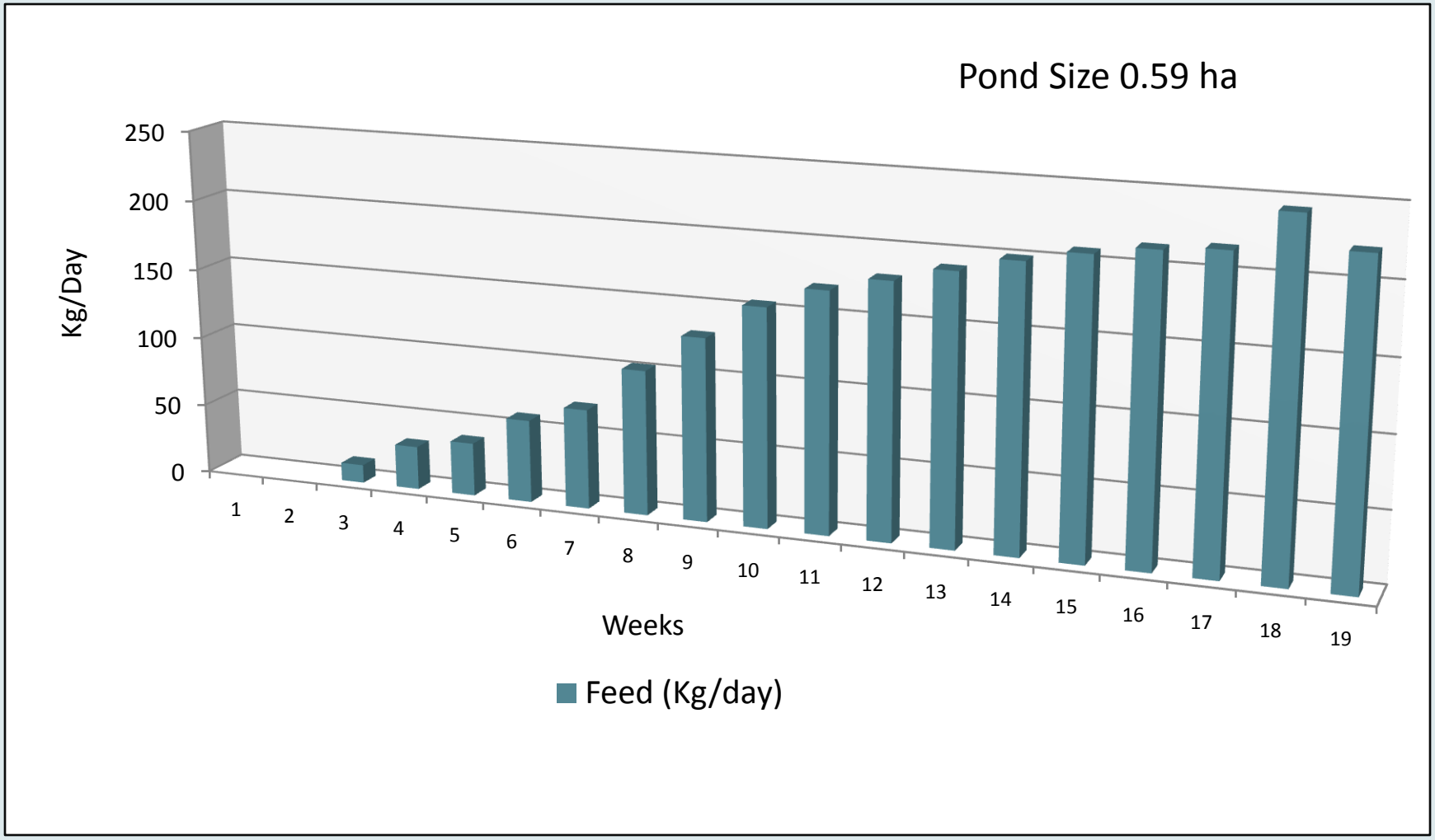
Bio-floc volume controlled at maximum 15 ml/Litre



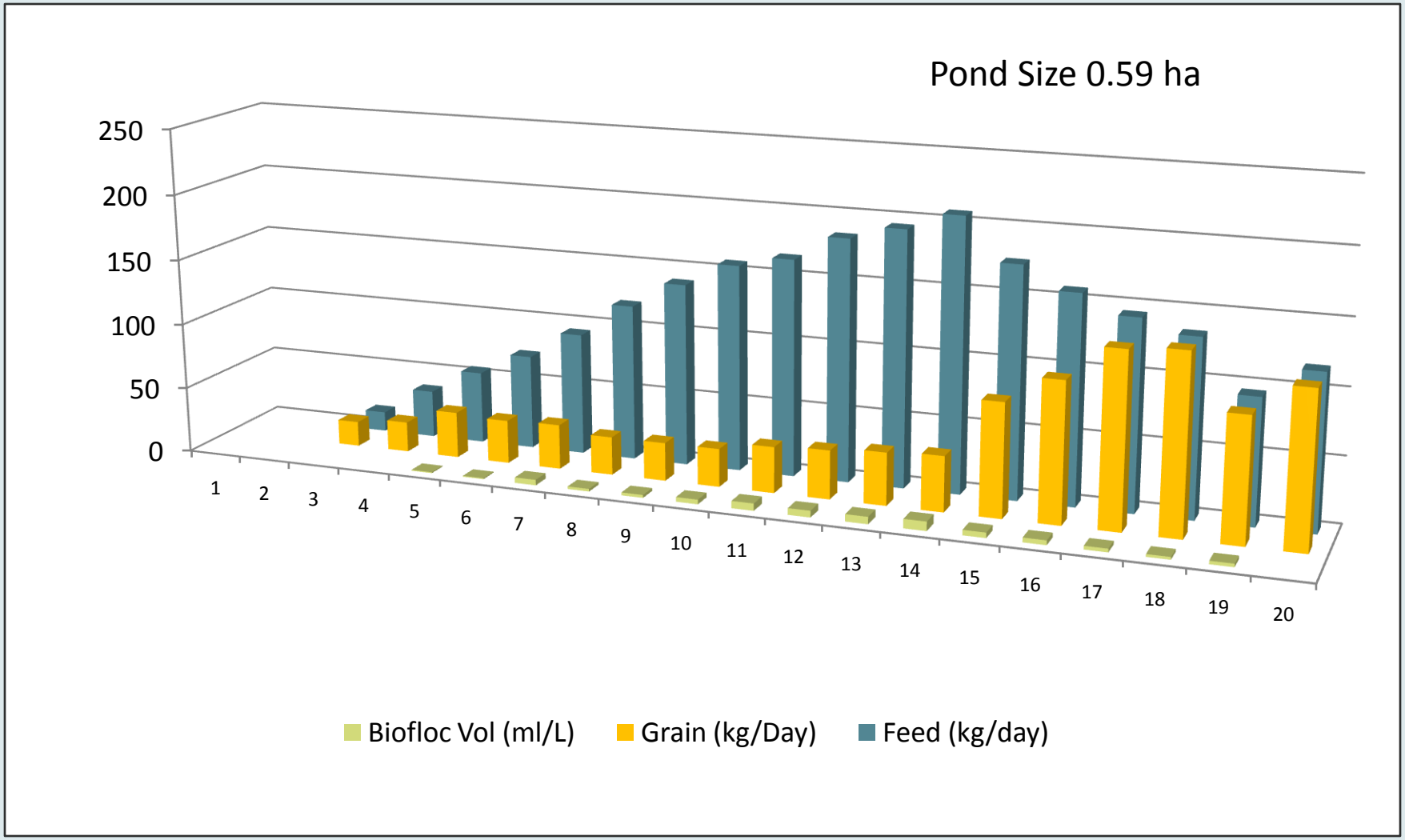




Application of Feed - Phytoplankton



Application of Feed & Grain BFT and Biofloc control



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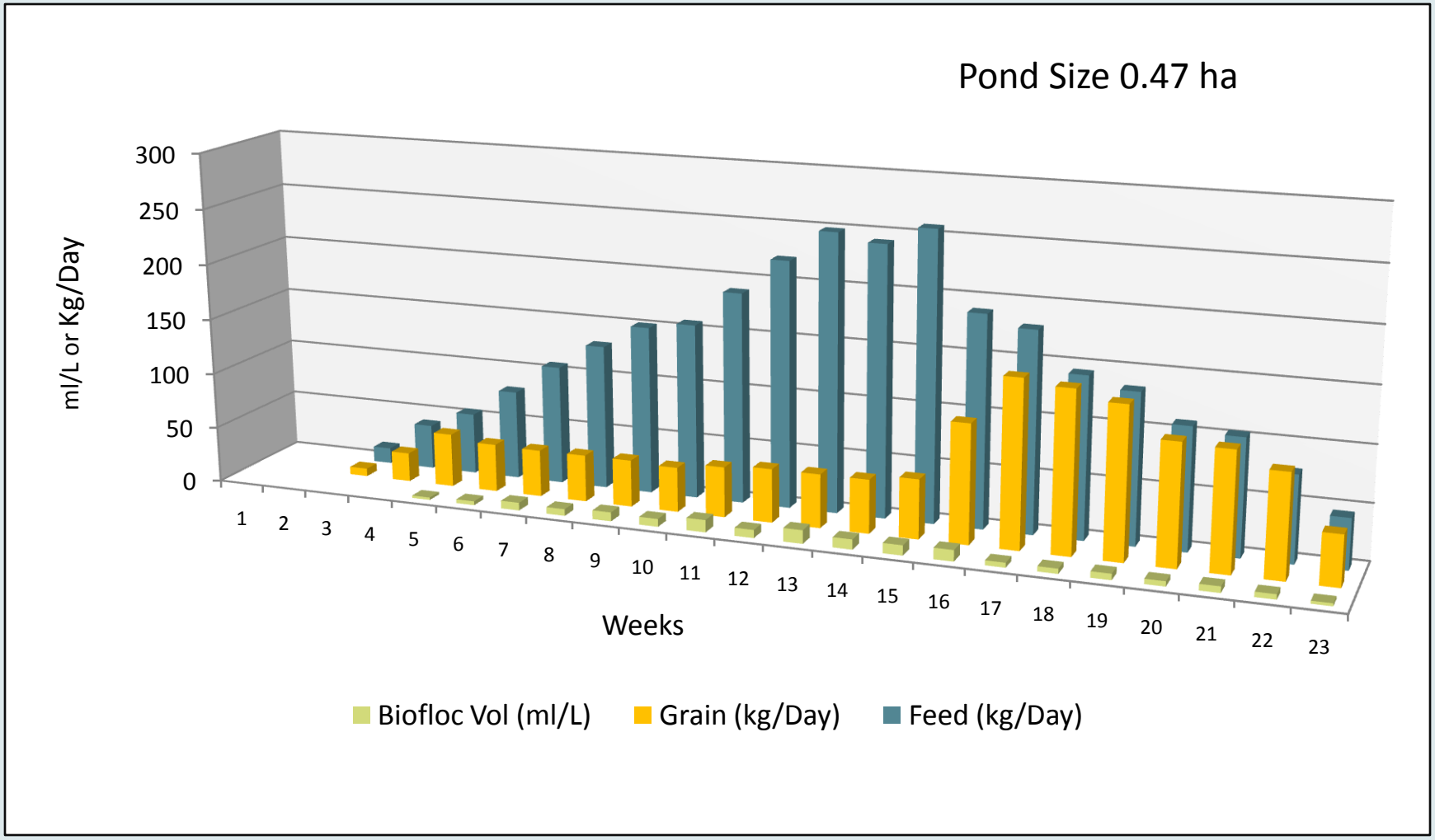

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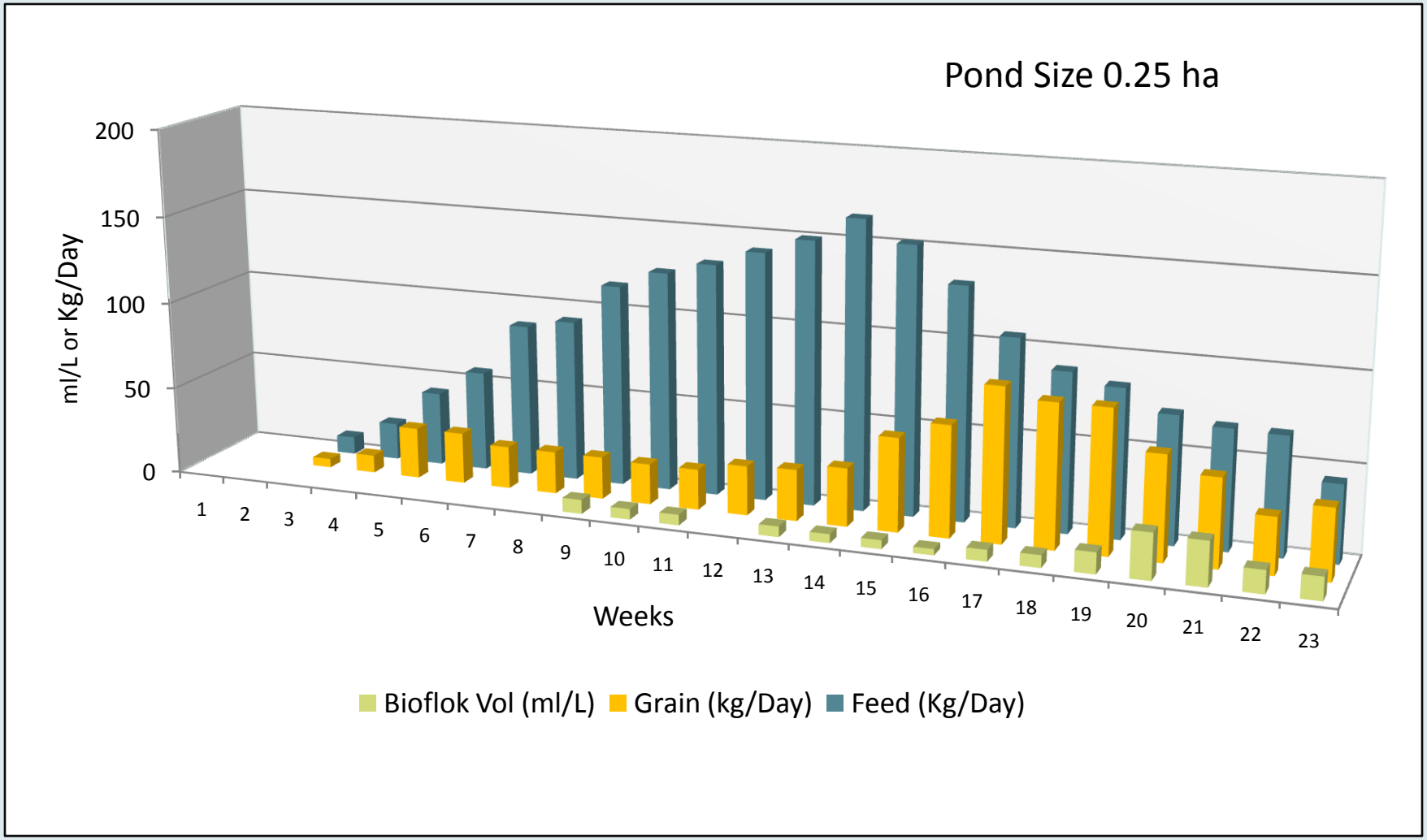


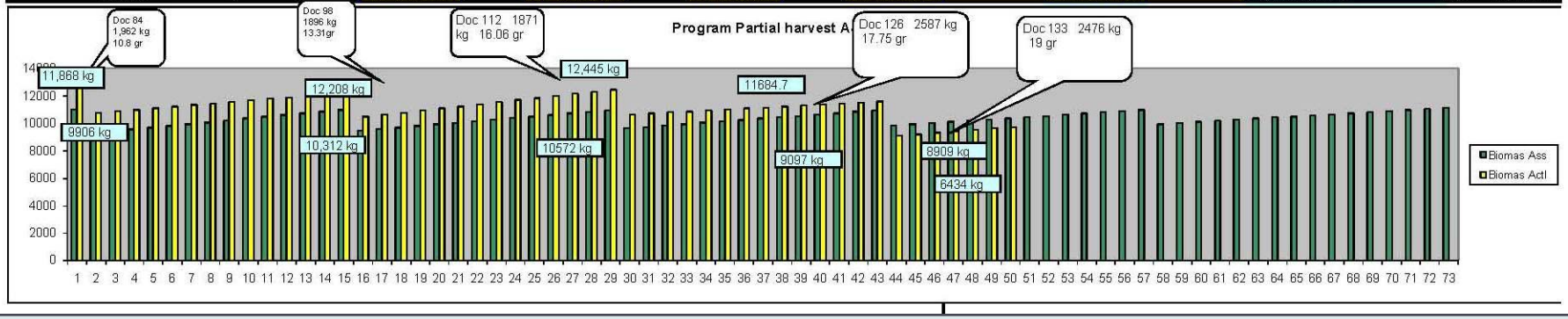
Partial Harvesting with Cast Nets

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

Partial Harvests – 0.47 ha Pond

PARTIAL HARVEST PROGRAM A4

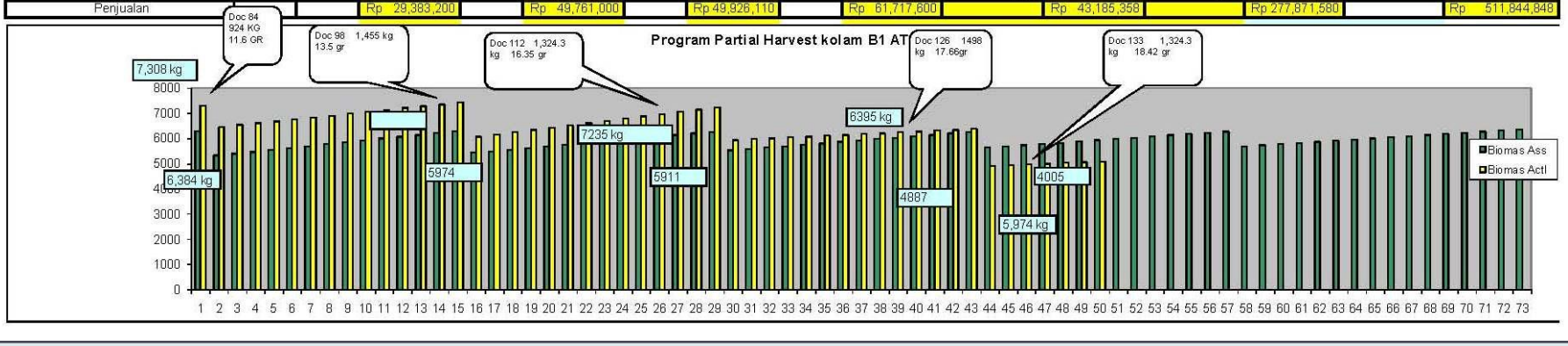
Description		Partial Harvest Program													
Pond Area	m	4740													
Stiking Density	pcs/m	257													
Initial Stok		1218180													
Aerator	hp	16													
Produktifity limit/Hp	kg/hp	650													
Final Produktifity Limit	kg/hp	1123.761908													
Produktifity Limit/Pond	kg/0.5 Ha	11511.801													
Final Produktifity Limit/Pond	kg/0.5 Ha	17980.19053													
Produktion Increase	%	6488													
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		
Biomas at MBW	%				0.18	0.14	0.20	0.14	0.12						
SR	Harvest	15	14.9	11	11.69	8	9.8	6	12.0	5	14.24	45.0	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			
Biomas	Harvest	1827.27	1962	1607.998	1896	1364.362	1871.5	1169.453	2587.7	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	192.973699	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		1033.5		969.9		738.6		599.4		
Size		100	92.6	83.3	75.1	71.4	62.3	62.5	56.3	52.6	52.6	47.61904762	46.6		
Harga			31800		34200.0		37700.0		41300.0		41800	45000	46600		
Penjualan			Rp 62,391,600		Rp 64,843,200		Rp 70,555,550		Rp 106,872,010		Rp 103,254,200		Rp 335,184,217		Rp 743,100,777



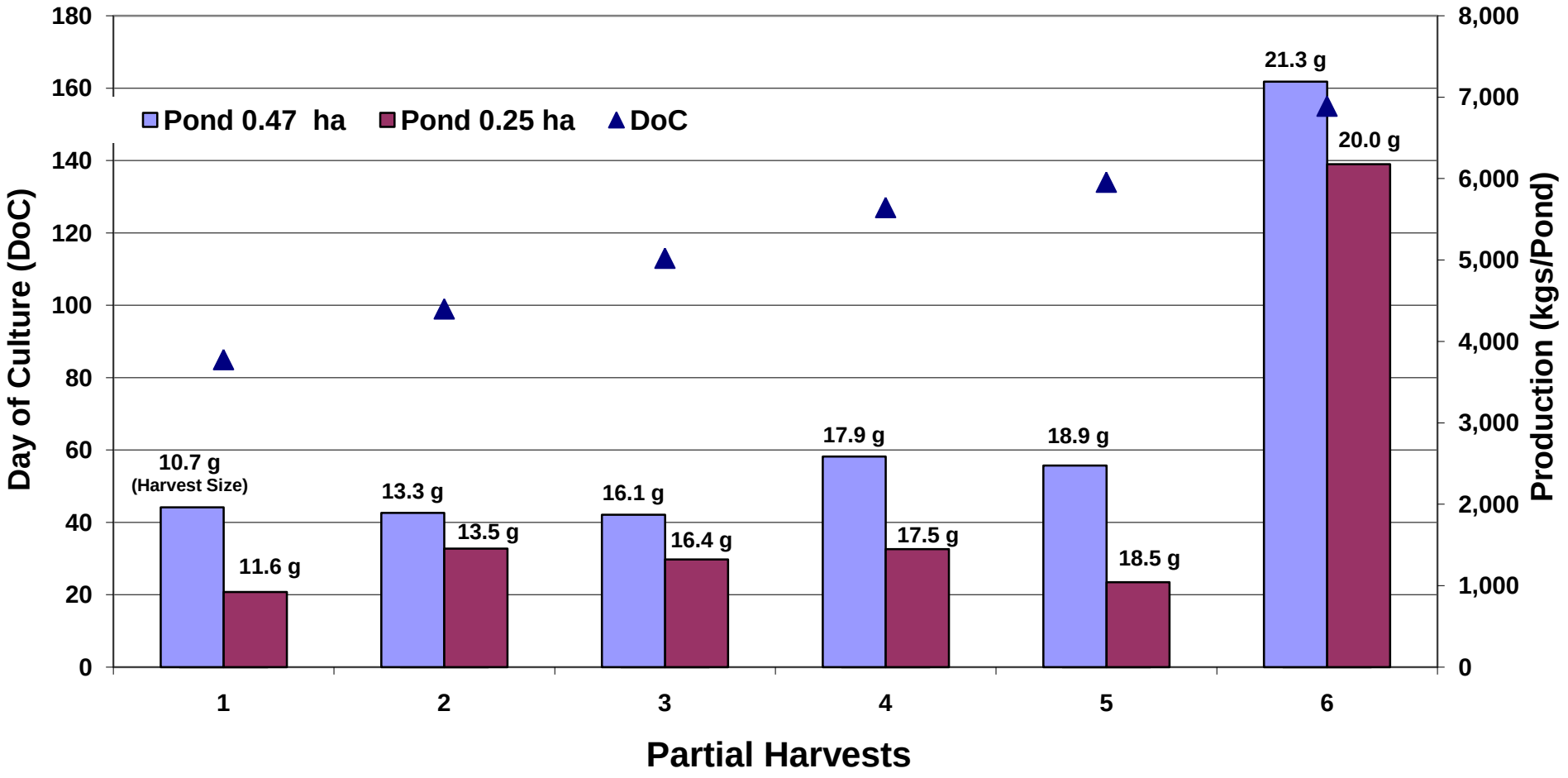
Partial Harvests – 0.25 ha Pond

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		
Biomas 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	102.35
%	Remain	75	78.62068966	64	63.22386426	56	51.65287256	50	39.5	45	31.4	0			
Populastion	Harvest	105000	79655.17241	77000	107777.7778	56000	80996.9419	42000	84824.46206	35000	56630	315000	306600	630000	716484.3541
Pcs	Remain	525000	550344.8276	448000	442567.0498	392000	361570.1079	350000	276745.6459	315000	220116	0			
Biomas	Harvest	1050	924	924	1455	784	1324.1	672	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			
Density		210	220.137931	179.2	177.0268199	156.8	144.6280432	140	110.6982583	126	88.0	0	122.6	0	
ADG			0.138095238		0.135714286	0.142857	0.203571429	0.142857	0.093571429		0.054285714		0.122857143		
			532		497.887931		492.639272		407.2773421		337.8775164		0		0
Kg/Hp			609		619.1		603.0		532.1		424.8		514.6		1034.9
Size		100	86.2	83.3	74.1	71.4	61.2	62.5	56.6	55.6	54.3	50	49.7		
Harga			31800		34200.0		37700.0		41200.0	43000	41400	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



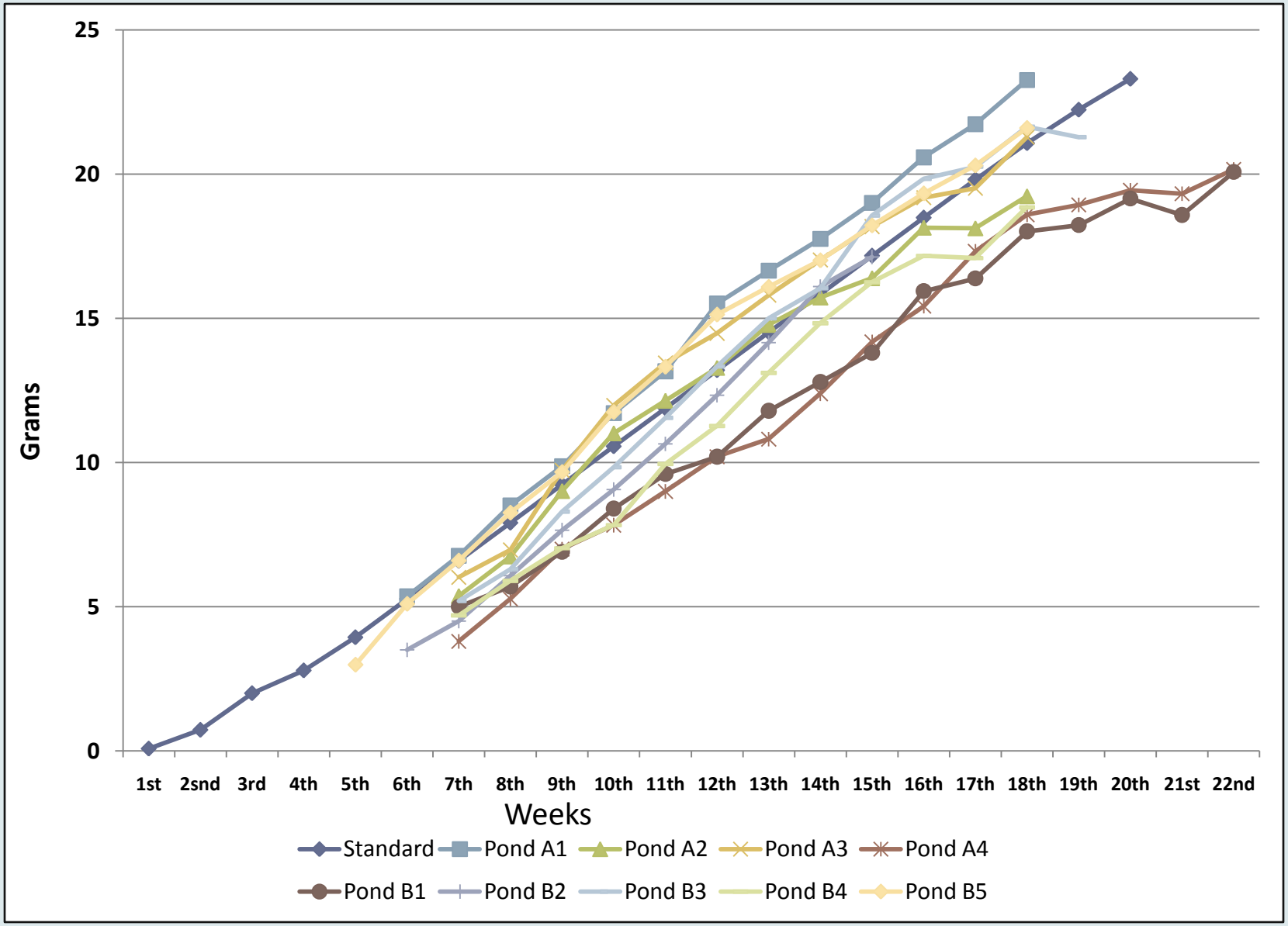
Partial Harvest Performance with Bio Floc Technology



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


25
20
15
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5
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Grams
1st
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11th
12th
13th
14th
15th
16th
17th
18th
19th
20th
21st
22nd
Weeks
Standard
Pond A1
Pond A2
Pond A3
Pond A4
Pond B1
Pond B2
Pond B3
Pond B4
Pond B5

Harvest Performance Summary ATP Sei Buluh

Periode : april 2007 - Aguastus 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

Harvest (Partial) Performance

Partial Harvest Performance with Bio Floc Technology (February - July 2008)

Pond/size	System	Energy Input		Density	Partial	Harvest				Production		FCR		SR	Energy Efficiency -kg/HP	
		(Pond)	(Ha)	(M2)		DoC	Biomas (Kg)	Size No/kg	MBW (gr)	Kg/Pd	Kg/Ha	GP	Feed	(%)	Std Capacity	Efficiency
1 5896 m2	Phyto	16 (PW)	27 (PW)	100	1	118	434	47	21.28							
					Final	127	11,027	43	23.26	11,461	**19,439**	0	**1.60**	75.72	560*	**720**
2 5896 m2	Bio Floc	18 (PW)	31 (PW)	145	1	108	2,092	59	16.95							
					2	121	1,016	55	18.18							
					Final	131	10,400	52	19.23	13,508	**22,910**	0.59	**1.20**	84.07	680*	**739**
3 5940 m2	Bio Floc	18 (PW)	30 (PW)	146	1	109	2,108	56	17.86							
					2	122	999	50	20.00							
					Final	130	11,279	47	21.28	14,386	**24,219**	0.56	**1.14**	80.95	680*	**807**
4 4704 m2	Bio Floc	16 (PW)	34 (PW)	257	1	85	1,962	93	10.75							
					2	99	1,896	75	13.33							
					3	113	1,871	62	16.13							
					4	127	2,587	56	17.86							
					5	134	2,475	53	18.87							
					Final	155	7,192	47	21.28	17,963	**38,229**	0.58	**1.12**	86.54	680*	**1,124**
5 2,500 m2	Bio Floc	9 (PW) 3 (BL)	36 (PW) 12 (BL)	280	1	84	924	86	11.63							
					2	99	1,455	74	13.51							
					3	113	1,324	61	16.39							
					4	127	1,448	57	17.54							
					5	134	1,043	54	18.52							
					Final	155	6,177	50	20.00	12,371	**49,484**	0.48	**1.11**	102.35	680*	**1,031**
6 2500 m2	Bio Floc	7 (PW) 3 (BL)	28 (PW) 12 (BL)	145	1	110	1,166	51	19.61							
					2	124	367	49	20.41							
					Final	127	5,012	47	21.28	6,545	**26,180**	0.50	**1.10**	86.35	680*	**655**
7 2500 m2	Bio Floc	9 (PW) 3 (BL)	36 (PW) 12 (BL)	145	1	110	892	61	16.39							
					2	124	323	57	17.54							
					Final	130	5,400	54	18.52	6,615	**26,460**	0.50	**1.10**	100.8	680*	**551**

Nyan Taw

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