WASTE PRODUCTION FROM PANGASIUS (*Pangasianodon hypophthalmus*) RAISED IN PONDS, FLOW-THROUGH AND RECIRCULATING AQUACULTURE SYSTEMS

Nhut Nguyen*, Nguyen Van Hao, Roel Bosma, Ep Eding, Johan Verreth and Marc Verdegem
Research Institute for Aquaculture No. 2, 116 Nguyen DinhChieu, Hochiminh City Vietnam, and Wageningen University, Aquaculture and Fisheries Group Nhut300676@yahoo.com

The aim of this study was to compare waste production and discharge during pangasius (*Pangasianodon hypophthalmus*) grow-out in ponds, flow-through tanks (FT) and indoor recirculating aquaculture systems (RAS). Data were collected from four commercial ± 1-ha 4-m deep ponds, and 3 FT and 3 RAS each with a 1-m^3 rearing tank. The outflow of each FT and RAS rearing tank was connected to a swirl separator to collect sludge. In addition, each RAS had a moving bed reactor, a trickling filter, a water reservoir and an overflow tank (Figure 1).

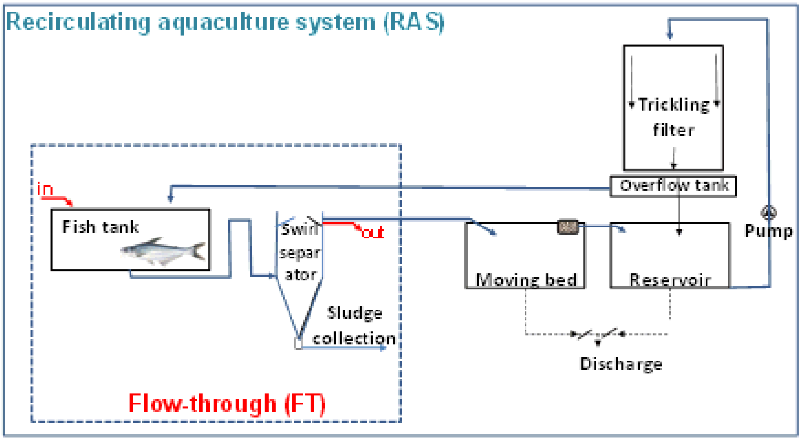

FIGURE 1: Set of flow-through and recirculating aquaculture systems. The water volume in the fish tank is 1 m^3.

Fish were grown from 15-31 g to 650 - 800 g average weight. The filets quality (colour and texture) in RAS and FT was grade 1. FCR in FT and RAS was 20 to 32% better than in in ponds. Survival in RAS and FT was 93-95% compared to 50-85% in ponds. The N discharge from FT tanks was > 2 times larger than from ponds which in turn was > 4.8 times larger than from RAS (Table 1).

TABLE 1: Summary of system performance and N and P budgets per kg pangasius produced.

Parameter	Unit	Pond		FT		RAS	
Stocking density	# m^{-2}	44 - 62		260.00		260.00	
Individual weight at stocking	g	31-45		16.00		18.00	
Days of culture	day	229-279		207.00		207.00	
Protein level diet	%	28-26		26.00		26.00	
Individual weight at harvest	g	781-920		678.00		658.00	
Specific growth rate	% bw d^{-1}	1.18-1.24		1.85		1.74	
Survival	%	50-85		95.00		93.00	
FCR	g feed (g fish)$^{-1}$	1.42-1.68		1.15		1.13	
Water consumption	(L/kg fish)$^{-1}$	2180-6630		16906		158	
		N	P	N	P	N	P
Input							
Fish	g (kg fish)$^{-1}$	1.4-1.9	0.2-0.3	0.54	0.08	0.59	0.10
Water	g (kg fish)$^{-1}$	7.3-19.8	2.1-4.8	38.38	9.97	0.36	0.09
Feed	g (kg fish)$^{-1}$	56.4-66.4	17.6-26.8	45.08	12.50	43.37	12.03
Output							
Fish	g (kg fish)$^{-1}$	25.2-27.8	2.4-3.3	25.50	2.40	24.60	2.60
Water seepage	g (kg fish)$^{-1}$	0.03-7.7	0.03-1.5	0.00	0.00	0.00	0.00
Water discharge	g (kg fish)$^{-1}$	8.4-27.8	6.7-14.5	55.40	18.97	1.72	0.09
Sludge removal	g (kg fish)$^{-1}$	1.3-11.9	0.1-4.2	3.07	1.14	2.71	1.36
Sludge accumulation	g (kg fish)$^{-1}$	2.8-7.0	1.1-6.4	0.00	0.00	0.00	0.00
Unaccounted	g (kg fish)$^{-1}$	13.7-18.0	2.3-6.2	0.03	0.05	14.70	8.08

The challenge for pangasius culture is to integrate RAS technology in pond aquaculture. The much better FCR and faster growth obtained in RAS would reduce production costs by 20.6 to 21.8 %, providing a margin of 2,600 to 4,160 VND per kg fish to apply RAS technology in ponds. Application of RAS technology in ponds would also reduce water consumption of pangasius farming. Hence, applying outdoor RAS technology in pangasius farming might in the long run result in lower production costs while further improving on environmental sustainability of the industry.