



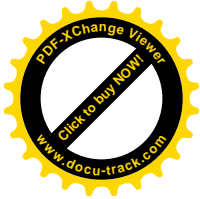
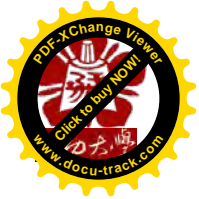
水產歐羅肥

降低動物飼料轉換率之免疫技術

從學界成功商化案例談我國生醫產學合作模式與策略



陳宗嶽



構想源起。。

人口數上升
糧食耗費量增加



短時間,高產量

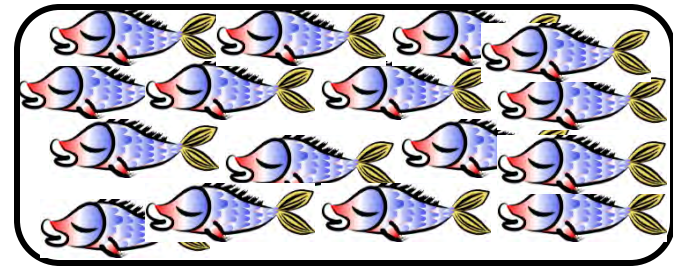


歐羅肥

A problem in aquaculture

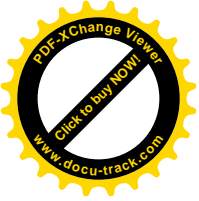


Space

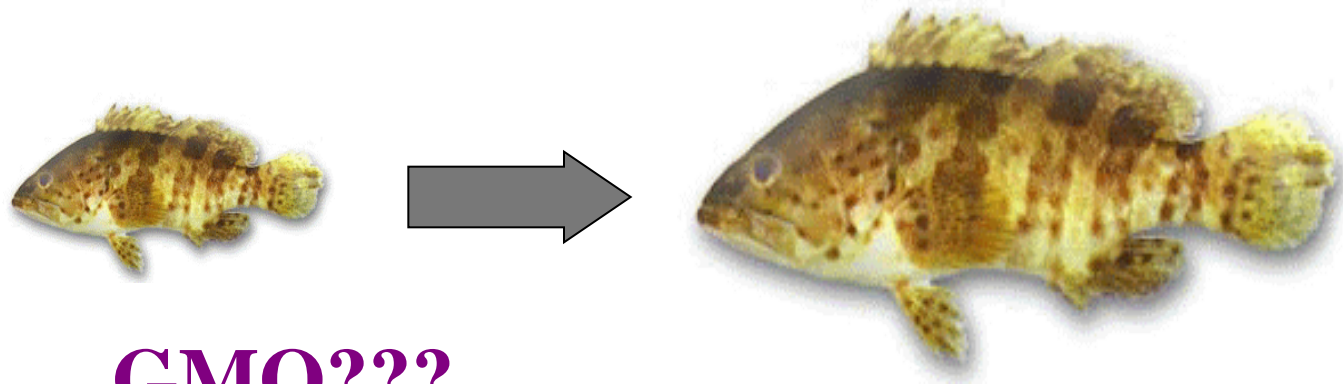
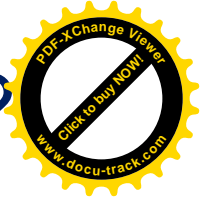


Correlative genes of muscle : e.g. *myostatin*

To decrease the cost and gain the economic value
in aquaculture.



How to increase the weight of fish ?



GMO???

Growth Hormone???

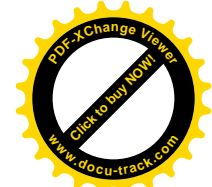
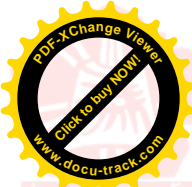
簡單易操作

上市容易

高安全性

消費者可接受



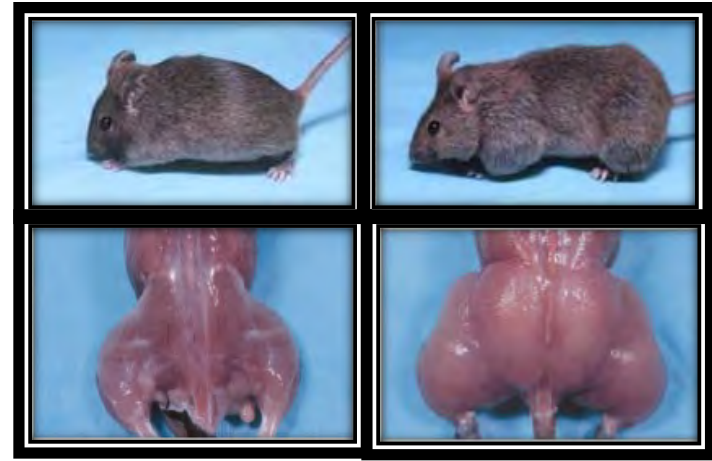


What is *myostatin*?

Myostatin is a growth and differentiation factor which belongs to TGF- β superfamily, it is a known negative regulator of skeletal muscle.



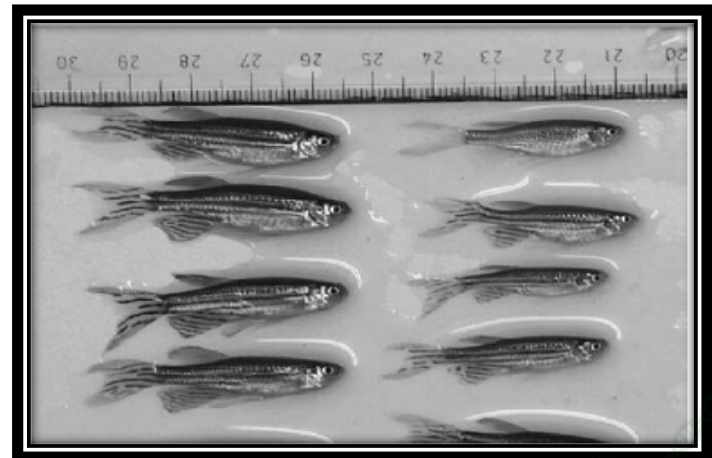
McPherron and Lee, 1997



Whittemore, 2003



Schuelke *et al.*, 2004

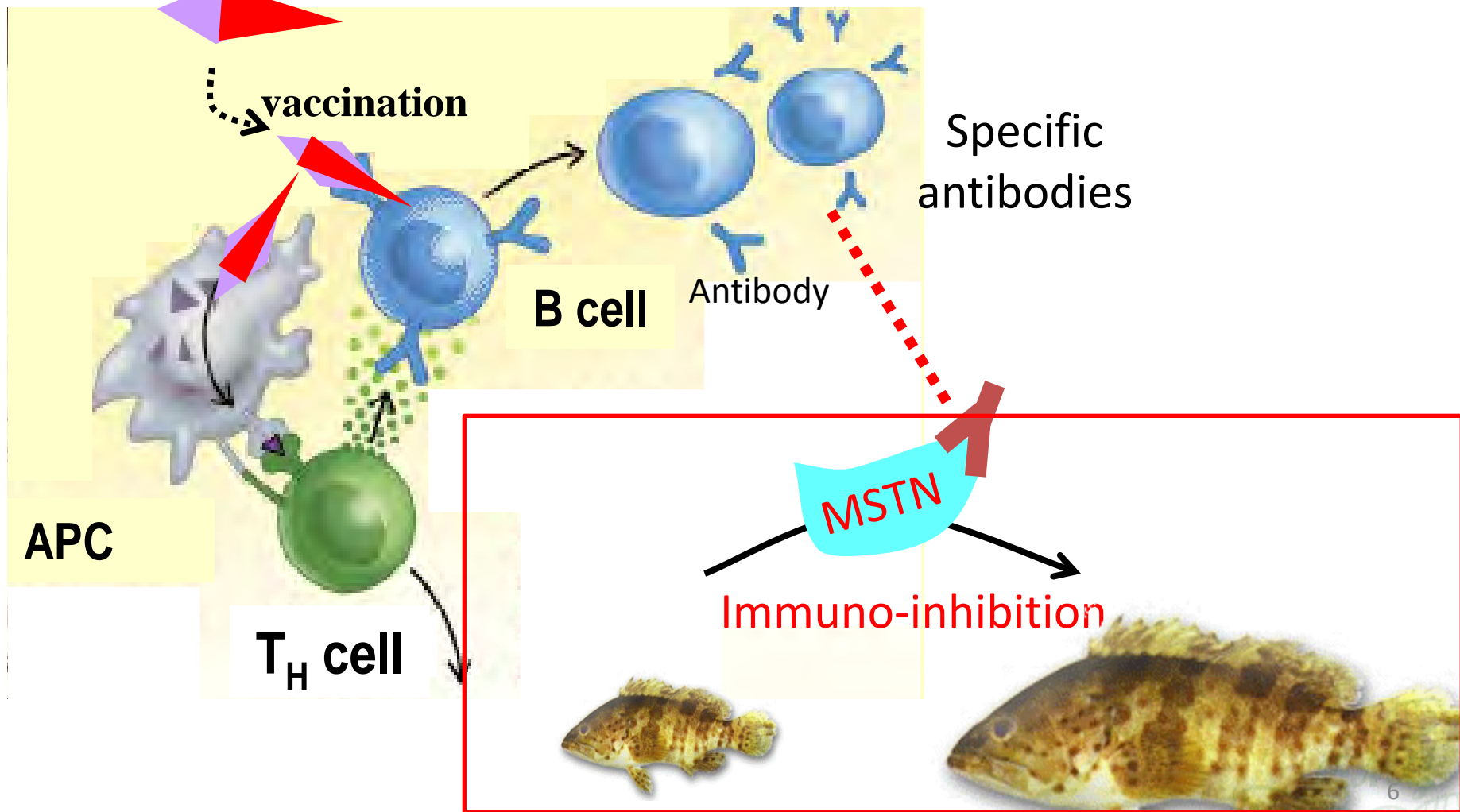


Acosta *et al.*, 2005



Immuno-inhibition model

Peptide Antigen

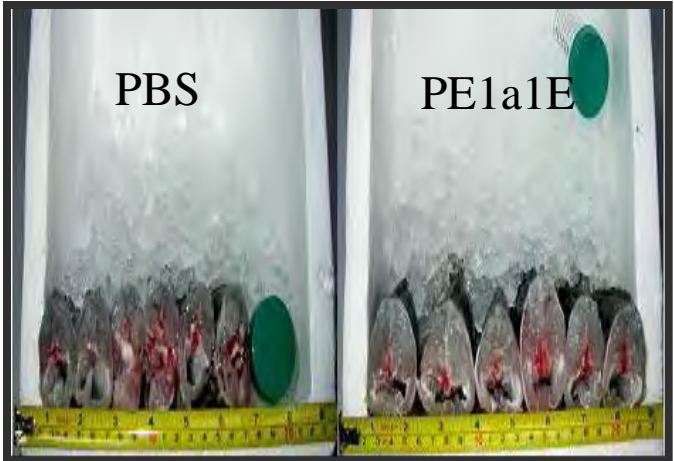
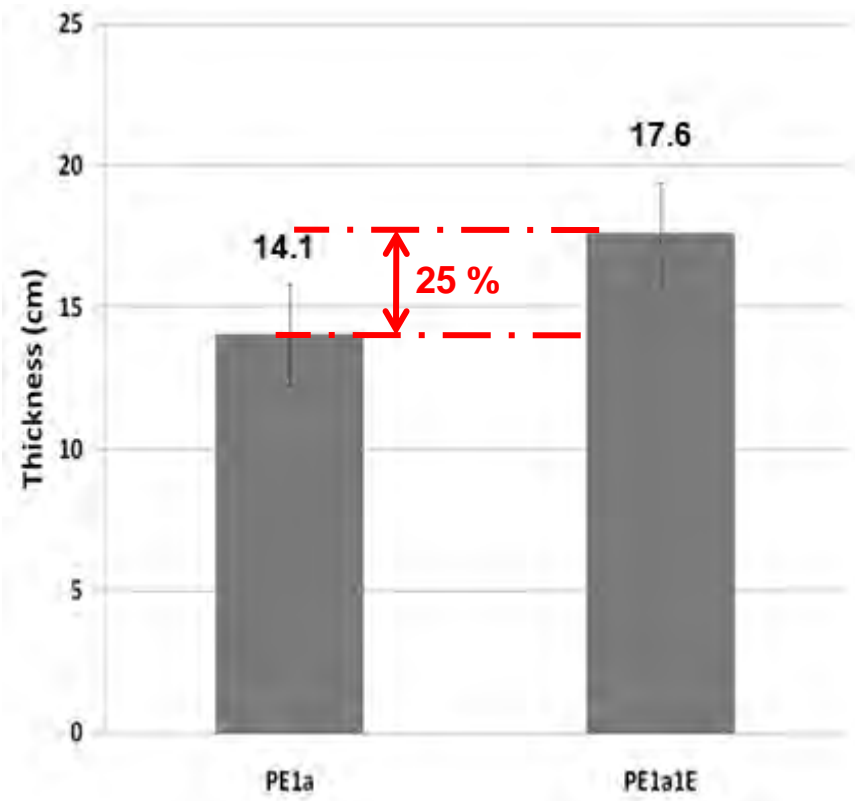


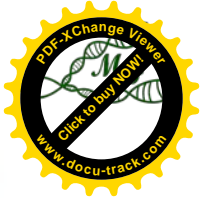
Immuno-inhibition increases the muscle in growth

(A)

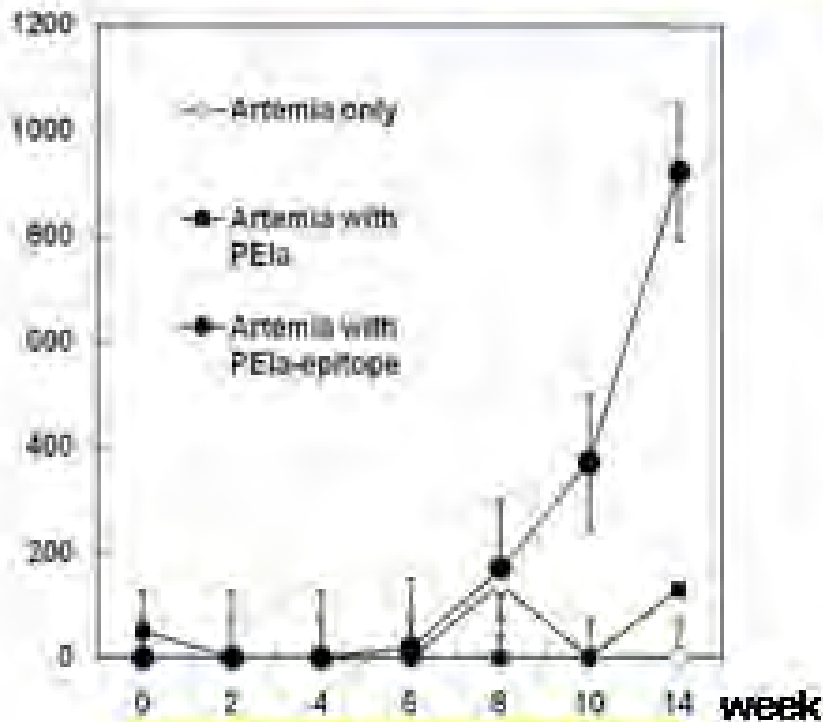


(B) Thickness comparison

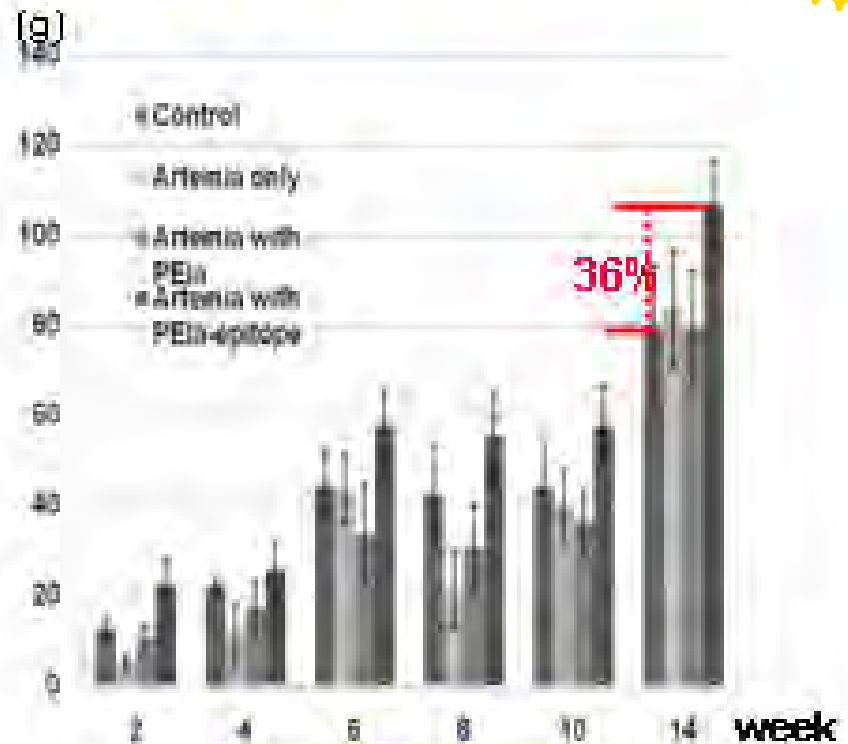




Oral delivery also increase fish weight



Quantification of grouper serum



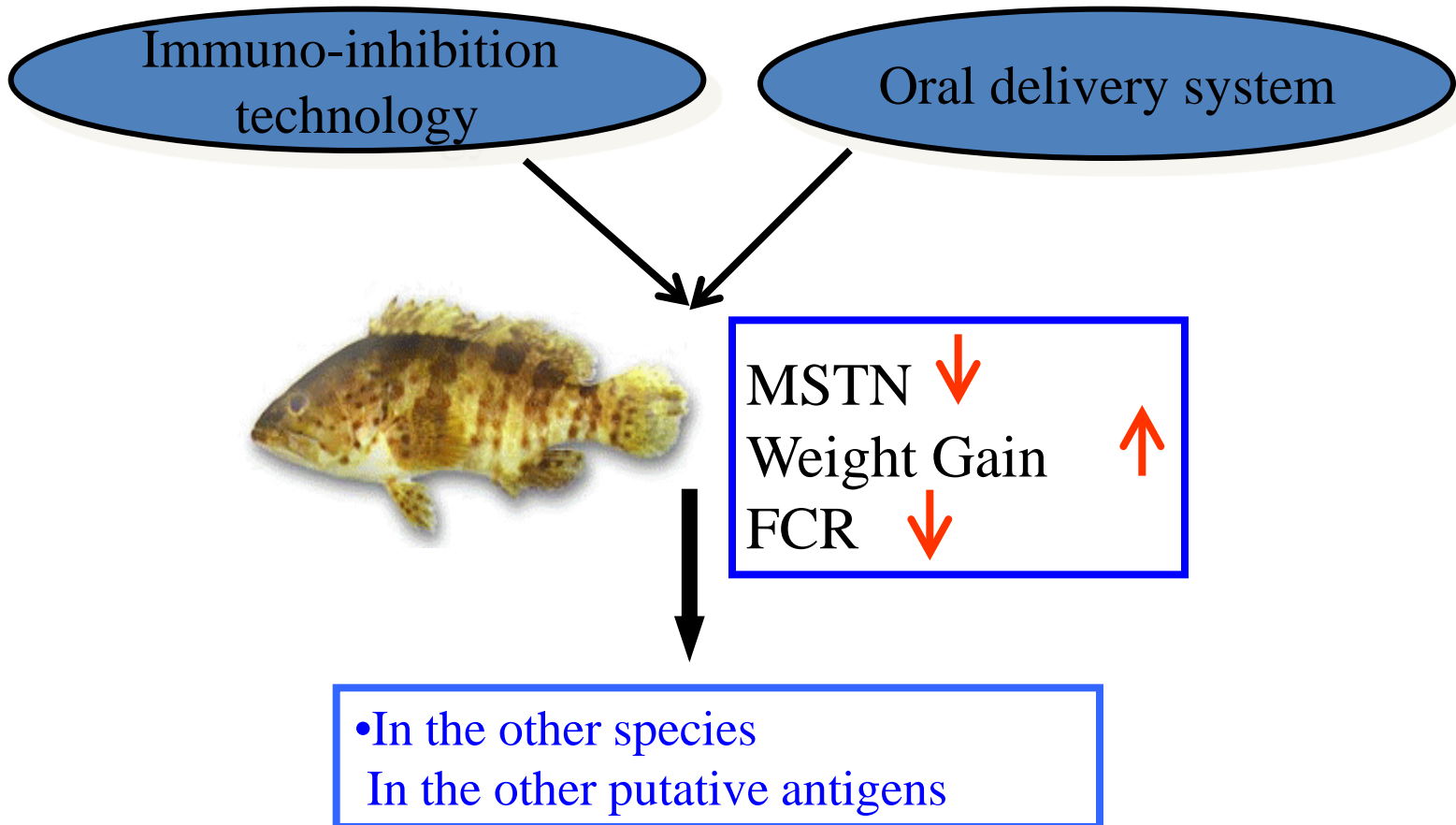
weight gain

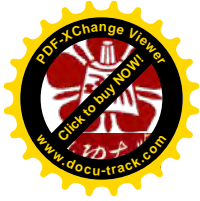
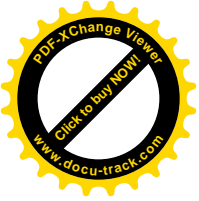
Feed conversion rate

$$FCR = \frac{\text{Feed intake (g)}}{W_2 - W_1 \text{ (g)}}$$

	Control	Artemia only	Artemia with PEIa	Artemia with PEIa-epitope
FCR	1.72	1.76	1.82	1.35

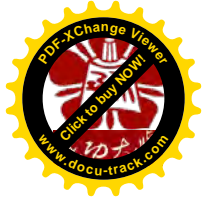
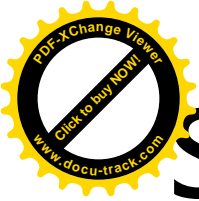
Summary





Small scale to mass scale



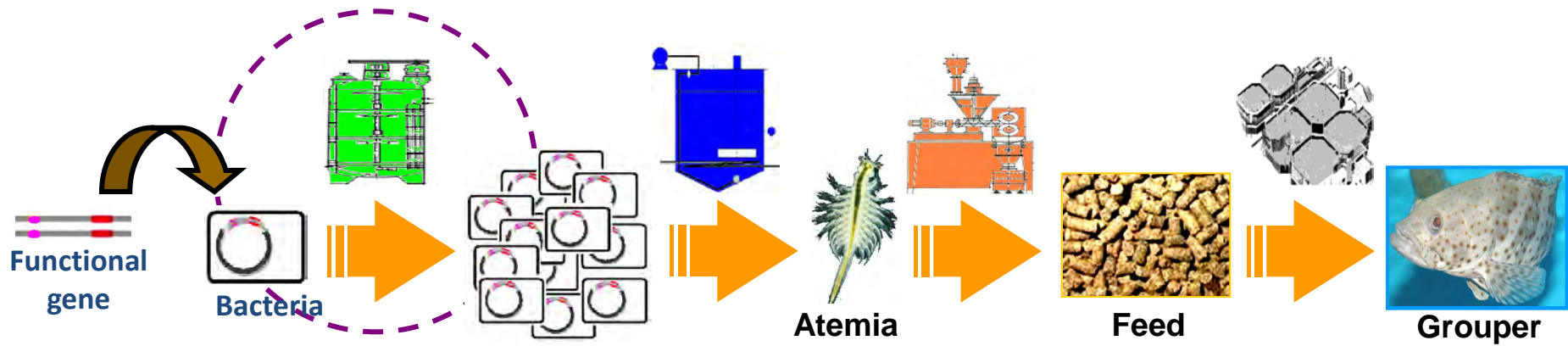


Small scale

Large scale



Fermentation









small scale










mass production



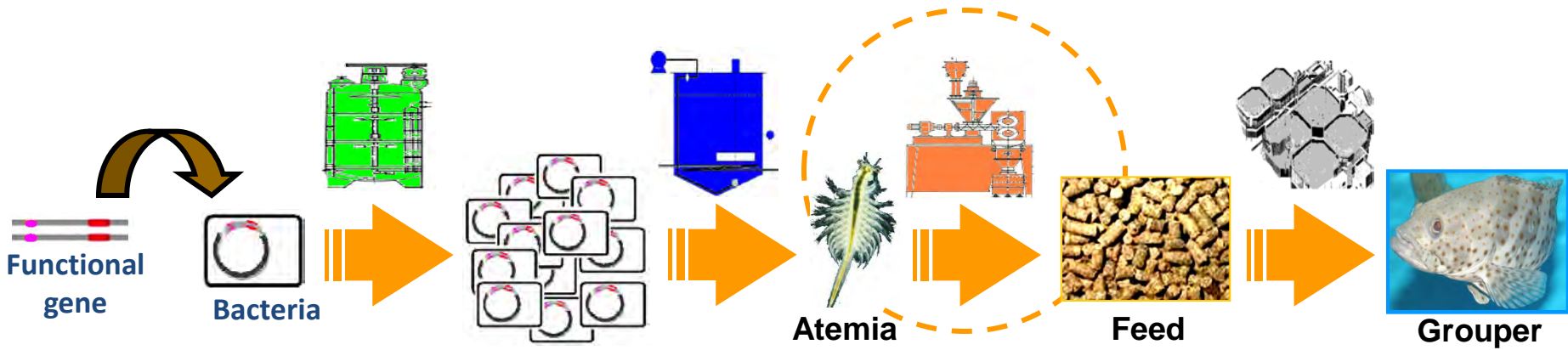
contrast with various fermentation processes

fermentation instrument			
large scale	1L	30L	10000L
fermentation production			
the concentration of target protein(ug/ul)	0.05	0.074	0.129
expression level	1	1.48-fold	2.58-fold

預定往後上市水產口服添加劑之原型商品型態

商品形式	含抗原細胞菌液	豐年蝦包埋 抗原細胞	微膠囊包埋 抗原細胞	腸衣包埋 抗原細胞	乳酸菌表現 抗原系統	混含加工抗 原細胞飼料
實際樣本						
現場應用	將豐年蝦浸泡於 菌液再撈起餵魚	可混合人工飼料或生物飼料再投餵魚群				直接投餵 魚群
		鰻粉 	下雜魚 			

Granulation



small scale



mass production



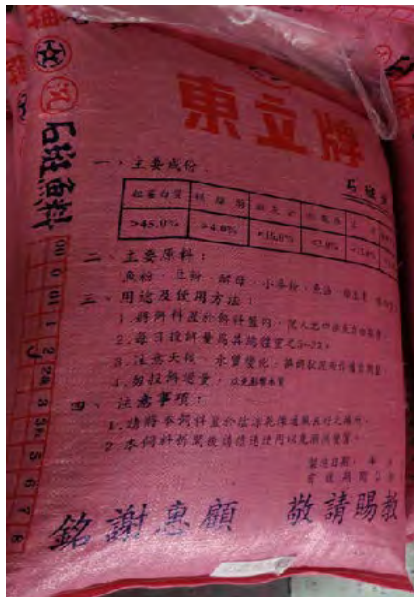


↑ 大型飼料製備系統

委託飼料加工廠製作

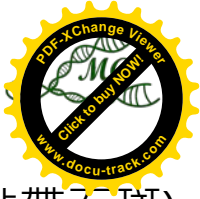
A. 實驗添加飼料 (實驗組)

B. 一般無添加飼料 (對照組)

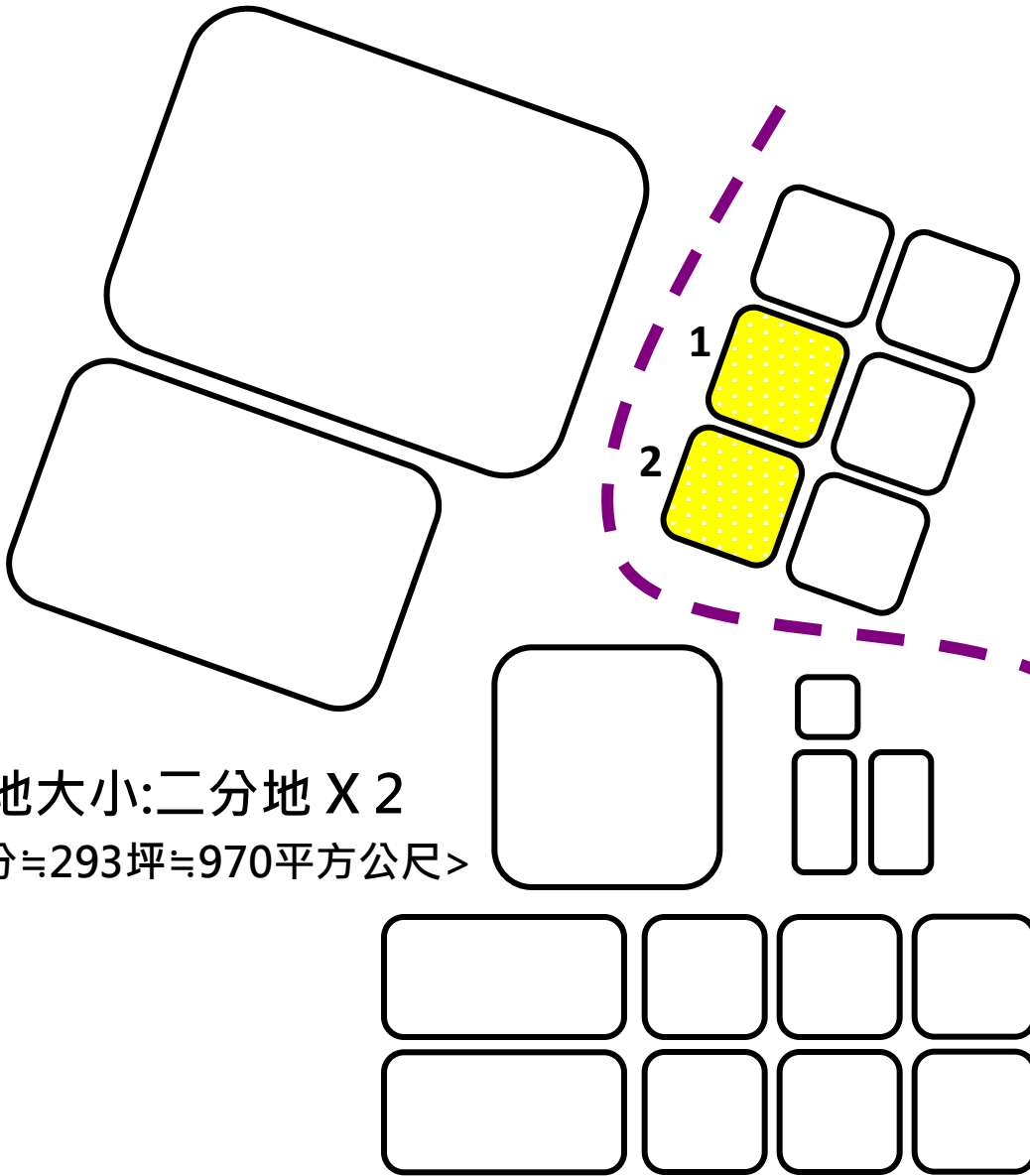


特殊添加飼料





日間試驗場 <台南四草>



場地大小:二分地 X 2
 <1分≒293坪≒970平方公尺>

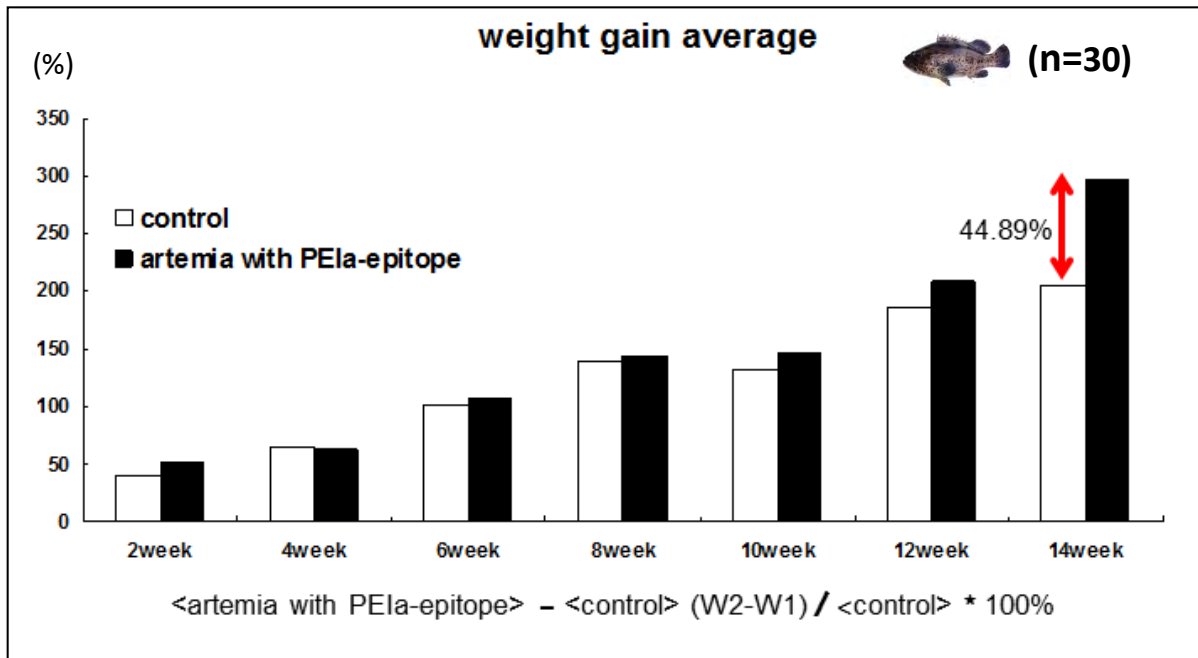
→ 實驗組(5000尾點帶石斑)

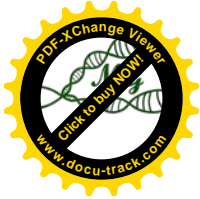


→ 對照組(5000尾點帶石斑)



體重增加百分比





第14週魚隻體重分佈圖(n=30)

