Nutrient balance at chain level:

a valuable approach to benchmark nutrient losses of milk production systems?

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Background

- Global consumption of meat and dairy products to increase by 82% between 2000 and 2050 (466 million tonnes of milk)
- Various Environmental problems e.g. eutrophication, acidification (production⬆ environmental pressure⬇)
- Environmental assessment method:

  Nutrient Balance (farm level, N&P)

Nutrient balance

Off-farm
Feed production

Nutrient Input

e.g. fertilizer, concentrates, roughage

Dairy farm

Nutrient Output

e.g. milk, meat, manure

Losses

Research question

Does a nutrient balance at chain level (i.e. cradle-to-farm-gate) provides more insights than a nutrient balance at farm level when comparing different farming systems/individual farms?

Data

Dairyman specialised farms (2010)

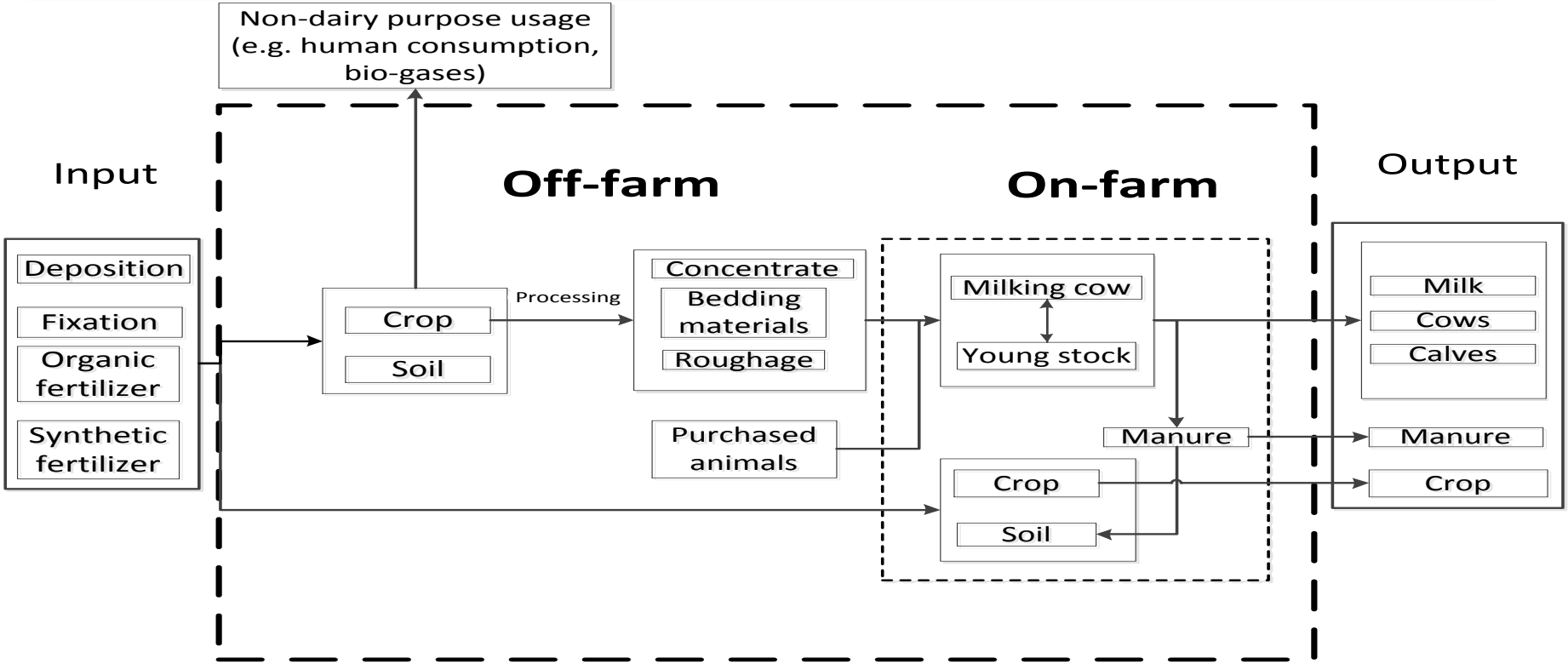
-- ***19 grass-based Irish farms (IR)***

Self-produced feed (on-farm)

-- ***13 concentrate-based Dutch farms (NL)***

Purchased feed (off-farm)

System boundaries



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Nutrient balance at farm level
Nutrient balance at chain level

Methodology

-- N and P losses at farm and chain level for each farm

kg nutrient losses/ton fat & protein corrected milk

-- Regression analysis

- Farm level & chain level
- Binary variable for country (Ireland, Netherlands)
- Intercept difference
- Slope difference

Results(N)

Indicators	Per ton FPCM		
	IR Mean(SD)	NL Mean(SD)	Mean difference (p)
N losses (kg N)			
On-farm	20(4.3)	8(1.6)	12(0.00)
Off-farm	2(0.9)	3(0.5)	1(0.00)
Chain	22(4.5)	11(1.4)	11(0.00)

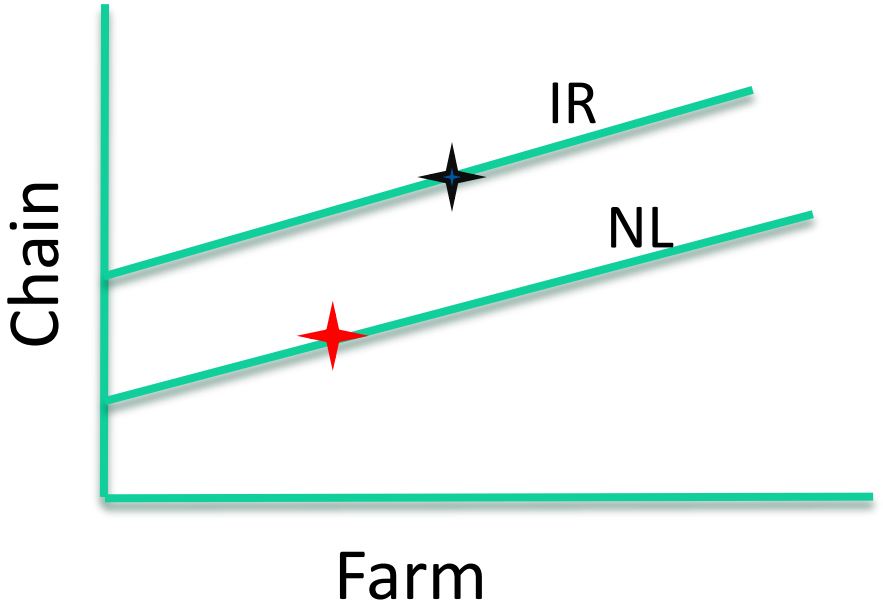
Results(N)

- Regression

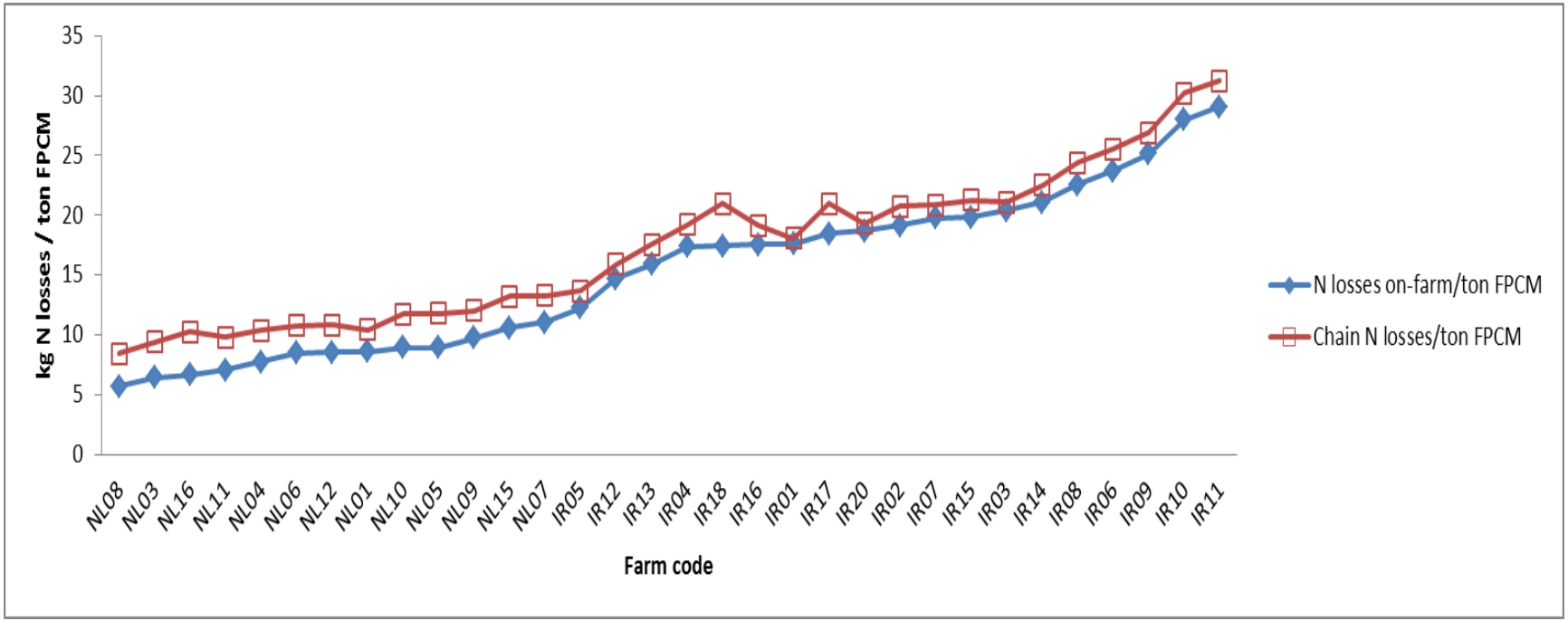
Irish farms VS Dutch farms

Intercept (different)

Slope (no difference)



Results (N)



Farms are ranked by increasing N losses at farm level

Results(P)

Indicators	Per ton FPCM		
	IR Mean (SD)	NL Mean (SD)	Mean difference (p)
P losses (kg P)			
On-farm	0.3(0.4)	0.1(0.2)	0.2(0.57)
Off-farm	0.6(0.3)	0.9(0.2)	0.3(0.00)
Chain	0.8(0.6)	1.0(0.3)	0.2(0.36)

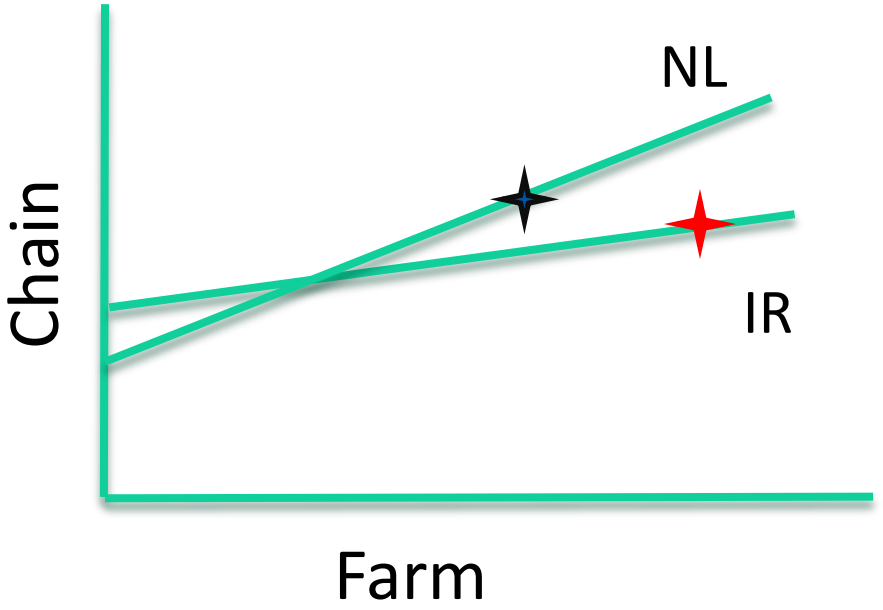
Results(P)

- Regression

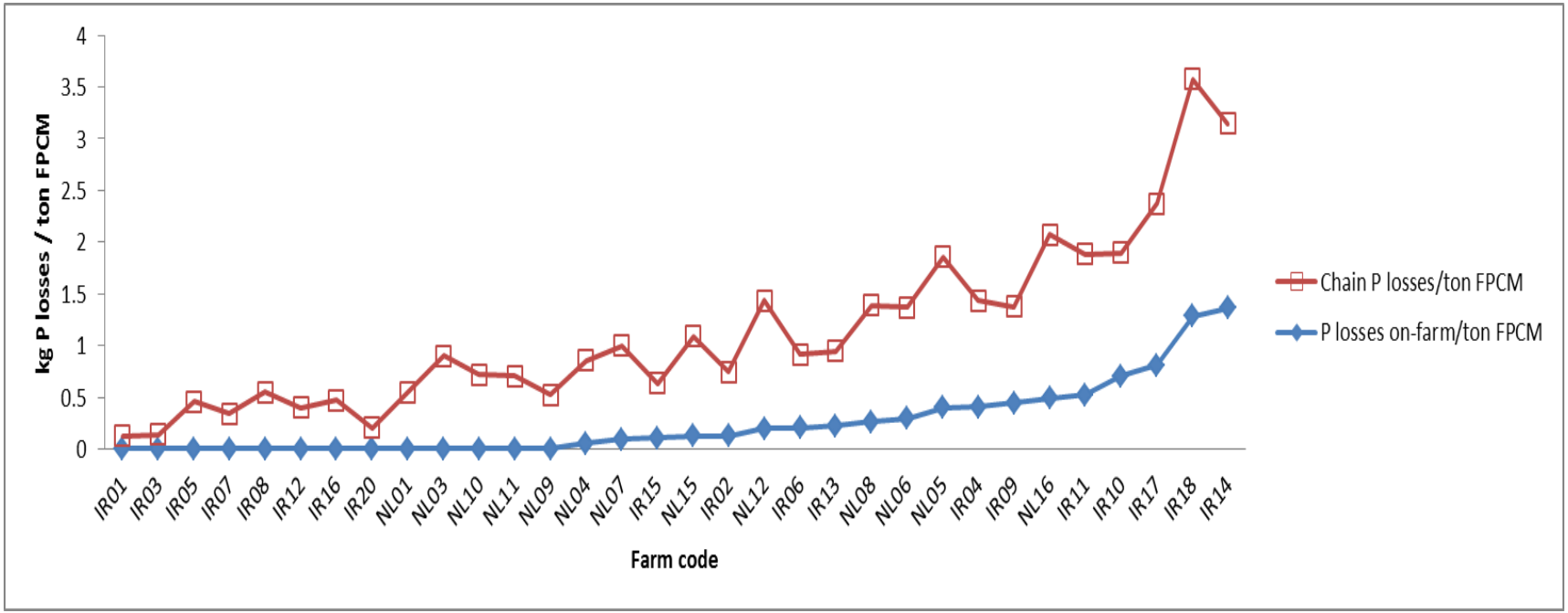
Irish farms VS Dutch farms

Intercept (different)

Slope (tend to differ)



Results ranking (P)



Farms are ranked by increasing P losses at farm level

Conclusion

- A nutrient balance at farm level:

-- benchmark systems

(1) on-farm losses between systems are large

(2) off-farm losses are relatively unimportant.

-- benchmark individual farms

changes in off-farm losses per unit change in on-farm losses are similar across farms.

- *A chain level balance of a sample set is required to verify these conditions*

Comments Suggestions Questions ?

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