

# STUDY OF THE INFLUENCE OF DIFFERENT FACTORS AFFECTING ON THE NITROGEN AND PHOSPHORUS BALANCE IN A SOW FARM (S1)

## INTRODUCTION/PROBLEM

↑↑Swine farm intensiveness → ↑↑Manure produced  
→ poor slurry management



Environmental impact due to N and P:

groundwater nitrification, eutrophication and water acidification

## LEGAL MEASURES (Regional Catalonia)

- Decret 283/1998: limitation of the application of total nitrogen as fertiliser (170NKg/ha/year).
- Decret 153/2019: nitrogen and phosphorus balance.

## OBJECTIVES

To establish the relative impact of:

- Number of weaned piglets per sow per year.
- Crude protein (N) and phosphorus (P) content in feed for different production stages.

On the nitrogen and phosphorus balance (NPBF) in a sow farm facility (S1).

To study the different measures applicable in production efficiency and feed management of manure, with the aim of minimizing the environmental impact.

## MATERIAL AND METHODS

- Reproduction of the nitrogen and phosphorus balance calculation method in an Excel spreadsheet with data from a 1000 sow farm.
- Calculation of the nitrogen balance (NB), the percentage of nitrogen reduction (%reduction) and the phosphorus balance (PB) for each variation factor (Table 1).

**Table 1:** Variation factors and values considered in the study on NPBF for the S1

Variation factor	Range of values			
Number of weaned piglets per sow per year	22-34			
Feeding nutrient concentration	Type of feed by physiological phase			
	Rearing	Gestation	Lactation	Nursery
Crude Protein (N), %	11-17	11-16	14.5-17,5	18-20,5
Phosphorus (P), %	0.55-0.65	0.5-0.65	0.5-0.65	0.6-0.7

In the case of weaned piglets factor, a prediction equation was applied to update the sow's feed intake according to sow production level.

## RESULTS and DISCUSSION

**Table 2:** Values of the slopes of the regression line for each variation factor on the NB, PB, %Reduction.

Slope	Piglets weaned per sow per year (per +1piglet)	Variation factors			
		Rearing	Gestation	Lactation	Nursery
(Per +1%CP-NB / per +0,1%phosphorus-PB)					
N (NKg/year)	+70	+112	+754	+412	+32
P (PKg/year)	+39	+99	+662	+361	+29
% Reduction	+0,44	+0,7	+4,73	+2,6	+0,2

Based on the results, an order of importance for each studied factor was established resulting in: gestation > lactation > rearing > productivity > nursery, respectively in terms of feed impact in N and P balance.

For the productivity factor, the BNG and BP per weaned piglet were also calculated with a result of -0,0014 NKg/ weaned piglet and -0,0049KgP/weaned piglet.

## CONCLUSIONS

- The feeding and the concentration of nutrients (protein and phosphorus) in the feed is the most important factor in the calculation of BNPG over productivity, which has a lesser impact.
- Gestation is the production phase with the highest relative impact on the nutrient excretion balance (N and P), as it is associated with the highest feed consumption due to being the longest stage in the sow's production cycle.
- Lactation, despite working with higher nutrient contents, has a lower relative impact (like productivity) basically due to the short duration of this phase in the sow's productive cycle.
- Finally, it is shown that as the efficiency of the production process increases, the environmental impact in terms of N and P excretion per unit of production is reduced.

## REFERENCES

- Catalunya. DECRET 153/2019, de 3 de juliol, de gestió de la fertilització del sòl i de les dejeccions ramaderes i d'aprovació del programa d'actuació a les zones vulnerables en relació amb la contaminació per nitrats que procedeixen de fonts agràries. (DOGC, Núm. 7911 - 5.7.2019, pàg. 1-100)
- Catalunya. DECRET 283/1998, de 21 d'octubre, de designació de les zones vulnerables en relació amb la contaminació de nitrats procedents de fonts agràries. (DOGC Núm. 2760 - 06.11.1998)