

Amendment of Nitrogen and Phosphorus in Swine Manure by Nutrition

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INTRODUCTION

A rapid expansion of swine production in prairie provinces increased the public awareness of the environmental concerns associated with swine manure - the odour and water quality being the main concerns. An excess nitrogen (N) and phosphorus (P) excreted in manure are responsible for adverse effects on water quality.

Manure from large swine production units with a limited land base can not utilize manure effectively as fertilizer resulting in storage and disposal problems. The new environmental regulations require nutrient management plans for swine farms.

OBJECTIVE

To develop new feeding strategies to minimize the excretion of N and P, and odours in swine manure for health of environment and sustainable swine production.

METHODOLOGY

A series of experiments were conducted using lean genotype crossbred barrows and gilts housed in total confinement heated building. Experimental diets containing covered-barley (CB) or hullless-barley (HB) were fed as pellets ad libitum with free access to drinking water. Pig weights and feed intake were recorded by-weekly.

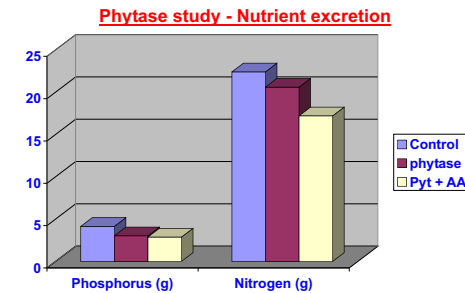
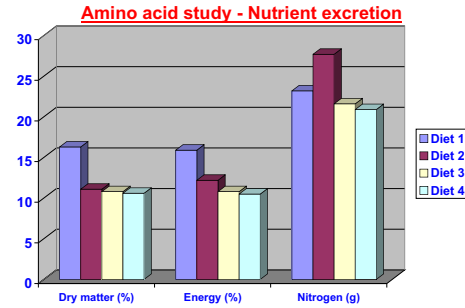
Nutrient balance studies were conducted using gilts. A total collection of faeces and urine from each gilt were collected for four 24 h periods. Nutrient intake, digestibility, retention and excretion were determined.

	Diet*				P-value
	1	2	3	4	
No. of pigs	56	56	56	56	
Average daily weight gain(kg):					
Grower	0.78	0.78	0.82	0.82	0.12
Finisher	0.91	0.88	0.88	0.90	0.94
Overall	0.84	0.83	0.85	0.86	0.40
Gain to feed ratio:					
Grower	0.43ab	0.42a	0.44bc	0.45c	0.01
Finisher	0.29a	0.30a	0.30a	0.32b	0.03
Overall	0.35a	0.35a	0.36a	0.37b	<0.01
Carcass value index:					
	108.4	106.5	108.0	108.7	0.67

*Diets: 1 = CB diet; 2 = HB diet; 3 = HB + AA; 4 = AA + enzyme

	Diet*			P-value	Barley type	Diet*
	CB	HB	1			
No. of pigs	72	72	48	48	48	
Average daily weight gain(kg):						
Grower	0.68	0.71	0.69	0.69	0.70	0.74
Finisher	0.89	0.97	0.92	0.95	0.93	0.51
Overall	0.78	0.83	0.79	0.8	0.81	0.37
Gain to feed ratio:						
Grower	0.44	0.46	0.45	0.44	0.46	<0.01
Finisher	0.34	0.37	0.34a	0.36ab	0.37b	<0.01
Overall	0.38	0.41	0.38a	0.39ab	0.40b	<0.01
Carcass value index:						
	109.3	107.6	106.5	108.1	108.9	0.19

*Diets: 1 = control; 2 = phytase 500 IU/kg; 3 = phytase + AA



CONCLUSIONS

- 1 HB diets decreased the excretion of faecal dry matter by 31.6 % compared to CB diets.
- 2 Replacing soybean meal with amino acids (AA)(lysine, threonine, methionine and tryptophan) in HB diet decreased the N excretion by 26.7 % in faeces and 19.2 % in urine.
- 3 It also decreased the production of ammonia by 30.0 %, and hydrogen sulfide by 60.0 % in manure.
- 4 Supplemental Ronozyme-phytase eliminated the need for inorganic P supplementation in CB or HB diets, and it decreased the P excretion in manure.
- 5 A combination of supplemental phytase and amino acids decreased the excretion of both P and N in manure.

IMPACT

A reduction of faecal dry matter excretion allows manure from more pigs to be spread on same land base resulting in less manure storage and disposal problems. Also this allows more pigs to be grown on same land base.

Decrease of N and P excretion in manure allows the utilization of more manure on a limited land base which minimize the adverse effects of swine manure on environment.

ACKNOWLEDGEMENTS

Sincere thanks to technical staff: R. Westwood; G. Turner; N. Thiry; F. Willms; and D. Sykes. This research was funded by the Agriculture and Agri-Food Canada Matching Investment Initiatives, Natural Resources of Canada, Hoffmann-La Roche Ltd., Saskatchewan Agricultural Development Fund, and Manitoba Pork Council.