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Finishing heavy boars for lower taint, suitable welfare and optimal performance

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POLITÉCNICO DE COIMBRA
ESCOLA SUPERIOR AGRÁRIA

Presented by
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Introduction

Could heavy boars be profitable for producers?

Two main drawbacks, aggressive behaviour and boar taint

This study aims to assess two factors:

- ✓ **Inulin** to reduce boar taint, dosage needs to be refined.
- ✓ Low stocking density and enriched **environment** to lower aggression

Towards a model to support pig farmers decision on finishing heavier male pigs

Related Works

Pigs+Care 3 years project for industry inovation
between 3 companies and 2 R&I

- ✓ Study boar's behaviour, using video-monitoring (24hours.day^{-1} with BORIS program)
- ✓ Look into indicators of stress and health status (cortisol levels and haematological parameters)
- ✓ Find new feeds and assess nutrient balances (N & P) to gain efficiency and reduce environmental impact at finishing
- ✓ Develop meat processing (mask boar taint…) and consumer studies (trained panel, acceptance of new products…)

Proposed Approach

Integrate methodology towards increasing boar finishing efficiency

Consider only natural methods without surgical or pharmacological procedures

Use of commercial pig units (instead of experimental) and give priority to promote farmers profitability

Promote animal welfare and environment awareness to pig farmers

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Project: **POCI-01-0247-FEDER-017626.**

Experimental Details

- ✓ 60, 3-cross Pietrain x F1 (LR × LW) boars (114 kg ± 10) were randomly assigned to 6 pens
- ✓ 3x2 factorial design:
  - -Three diets, with 0%, 3% and 6% of inulin
  - -Two housing alternatives (Normal and Improved)
- ✓ 3 isoproteic (15.5% CP) and isoenergetic (2.3 Mcal NE) diets of 0, 3 and 6 % inulin, balanced for essential amino acids (NRC 2012).
- ✓ Pens with 1 or 1,9 $m^2.pig^{-1}$ (10 boars each).
- ✓ The lower density pens had 2 nipple drinkers instead of 1 and had 2 extra entertainment toys.

Experimental Details

- ✓ A seven-week trial took place and measurements were taken through the trial and at slaughter.
- ✓ Blood was collected from the jugular vein into heparinized tubes at the beginning, middle and end of the trial and as well as at slaughter. Centrifuged and the plasma maintained at -80ºC until further analysis.
- ✓ At the end of the trial boars were slaughtered at a commercial slaughterhouse following the standard EU procedures.
- ✓ Carcass yields (%C) as a % from live weight was assessed subsequently.

Experimental Details

Procedure for sample preparation for plasma skatole and indole analysis by HPLC-FL (based on R. Claus *et al.*, 1993)

Vortex 30s
- 2mL diethylether + 25µL 2-MID (at 1µg.mL^{-1}) + 0.5mL mobile phase + 0.5 mL plasma

Freeze -20C 60`
- Centrifuge 20 mim at 1200 g at 4C

Dry N stream 40C
- Transfer supernatant (ether phase)

Into HPLC
- Redissolve in 0.5mL mobile phase + Filter (RC 25, 0.2µm) into HPLC vials

Experimental Details

Skatole and Indole HPLC-FL (Gilson) system:

- ✓ RP-C18 column (5µm, 125mmx4.6mm) at 40 °C
- ✓ Isocratic gradient, flow rate 1 mL. min^{-1}
- ✓ Mobile phase - water:acetonitrile:2-propanol (60:25:15)
- ✓ Excitation and detection wavelengths were set at 220nm and 271nm respectively
- ✓ Internal standard – 2-methylindole (2MI)
- ✓ Interface software Gilson Unipoint

Experimental Details

- ✓ STATISTICA software (2008, version 8; Stat Soft, Inc.) was the chosen program.
- ✓ Data was submitted to Kolmogorov–Smirnov and Levene's tests, to verify normal data distribution and homogeneity of variances, respectively.
- ✓ Data was analysed by two-way factorial ANOVA.
- ✓ Post hoc Tukey's test was used when significant differences between means were detected.
- ✓ Significance differences were considered when $p < 0.05$.
- ✓ Most of the results are presented as mean ± SD.

Results and Analysis

Every raw component of the mix was analyzed for inulin (AOAC 999.03)

The mix inulin content before and after pelleting was studied:

Feed	Inulin (%)
Fibrofos 60%	59.4
Weat grain	5.9
Wheat bran	5.4
Soya meal 47%	4.5
Rape meal	3.3
Barley grain	2.2
Sunflower meal	2
Corn grain	0.2
Pellet mix 0%	1.8
Pellet mix 3%	4.4
Pellet mix 6%	7.6

Diets	Before processing (A)	Fibrofos 60% (B)	After processing (C)	(A - B)	(A - C)
0% Inulin	3.2	0	1.8	3.2	1.4
3% Inulin	6.2	3	4.4	3.2	1.8
6% Inulin	9.1	5.9	7.6	3.1	1.5

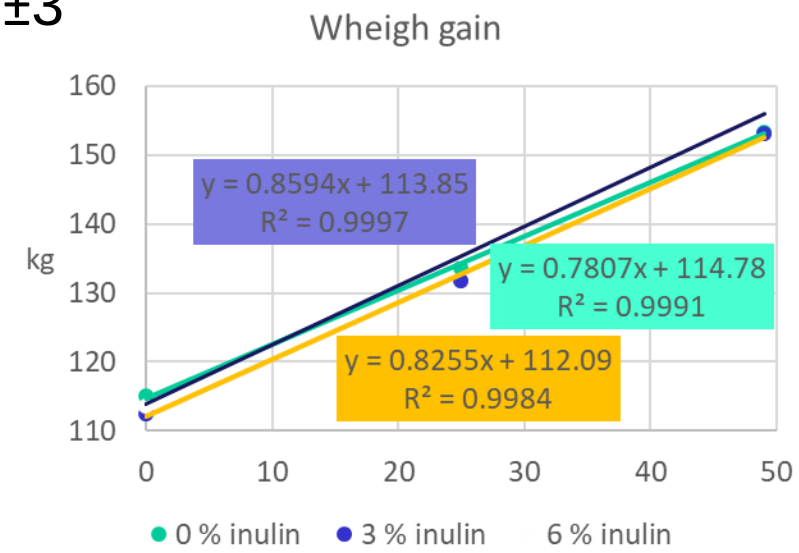
Average intake 2.7 kg.day^{-1} per pig.

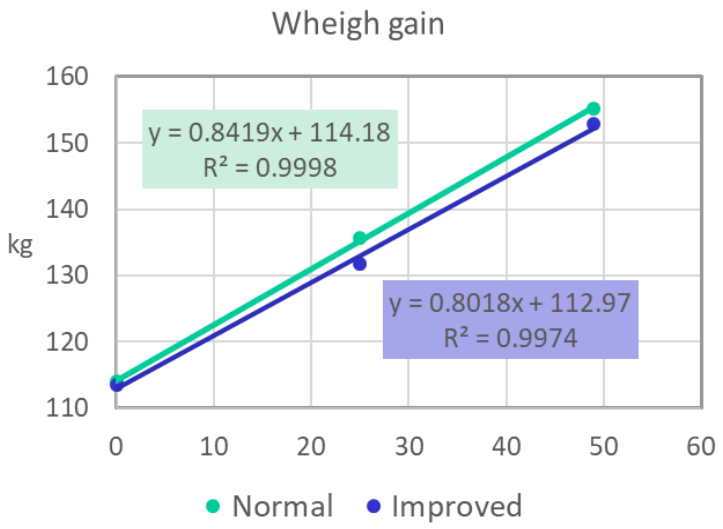
The feed cost was 0.21, 0.27 and 0.33 €.kg^{-1} for 0, 3 and 6% inulin diet respectively

Results and Analysis

Pigs were individually weighed at the beginning, middle and end of the trial.

The average final weight was 154 kg ± 12 with an average daily gain of 0.83 kg ± 0.2. Mean carcass yield was 74% ±4 and lean-meat 58% ±3





For a confidence level of 95%, housing and diet had no significant differences on growth, carcass yield or lean-meat.

Results and Analysis

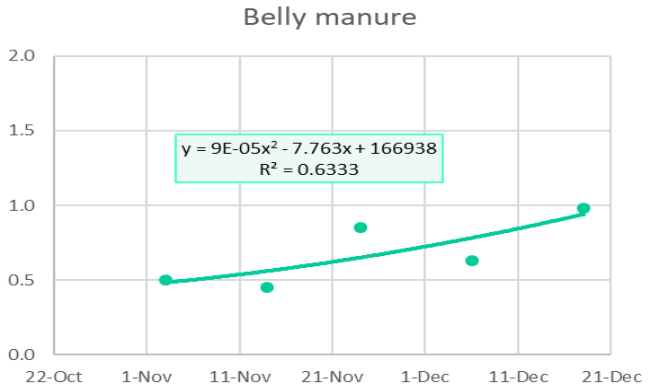
Average daily weight gain (AWG) and carcass yield (%C)

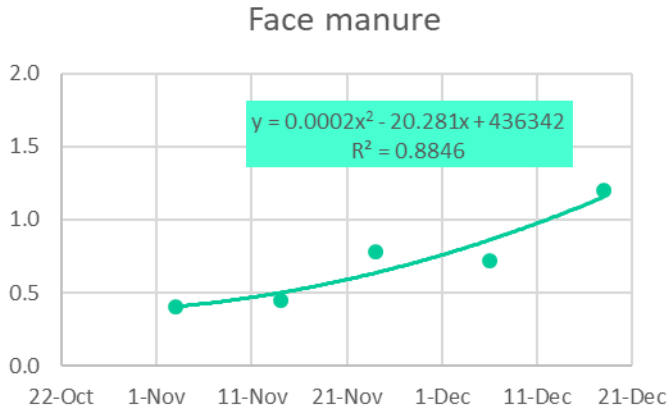
	Normal Housing			Improved Housing			Anova p-value		
	Control	3	6	Control	3	6	Diet	Housing	Diet x Housing
AWG Kg.day-1	0.8 ± 0.2	0.9 ± 0.2	0.9 ± 0	0.8 ± 0	0.8 ± 0.1	0.9 ± 0.2	0.229	0.684	0.708
% C	74 ± 1.2	73 ± 1.2	74 ± 1	74 ± 1	74 ± 1.2	72 ± 1.2	0.605	0.704	0.564

Results are expressed as means ± SD (n=10) measured in boars receiving control or supplemented diets (3 and 6 % inulin) for 48 days and housed at normal or improved density.

Results and Analysis

In loco individual body surface contaminated with faeces were assessed (Welfare Quality®-protocol) every 2 weeks using a score of 0 to 2 points as skatole and indole in manure can be absorbed through skin and lungs



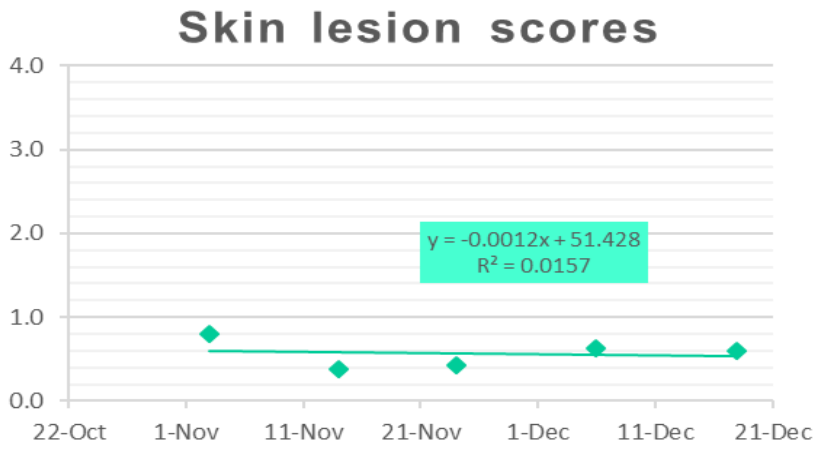


Inulin	Belly manure	Face manure
0%	0.5 ± 0.3	0.6 ± 0.3
3%	0.8 ± 0.4	0.8 ± 0.6
6%	0.7 ± 0.4	0.8 ± 0.5

Housing	Belly manure	Face manure
Normal	0.8 ± 0.3	1 ± 0.4
Improved	0.5 ± 0.3	0.5 ± 0.4

Results and Analysis

In loco individual skin wounds and scratches were assessed (Welfare Quality®-protocol) every 2 weeks and after slaughter using a score of 0 to 4 points proportional to the skin damage



Inulin	Skin lesions
0%	0.6 ± 0.5
3%	0.7 ± 0.6
6%	0.4 ± 0.6

Housing	Skin lesions
Normal	0.6 ± 0.5
Improved	0.6 ± 0.6

Results and Analysis

Plasma Cortisol levels (ng.mL^{-1})measured with a competitive enzyme immunoassay kit (ENZO)

Normal Housing			Improved Housing			Anova p-value		
Control	3	6	Control	3	6	Diet	Housing	Diet x Housing
80 ^{a} ± 17	70 ^{ab} ± 24	53 ^{b} ± 10	53 ^{b} ± 21	45 ^{b} ± 20	57 ^{ab} ± 23	0,176	0,004	0,027

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Initial average levels ranged 55,6 (± 26) ng.mL^{-1}.

Results and Analysis

Plasma skatole and indole ($ng.mL^{-1}$) at 48 days of trial

	Normal Housing			Improved Housing			Anova p-value		
	Control	3	6	Control	3	6	Diet	Housing	Diet x Housing
Skatole	$36^{ab} \pm 7$	$12^{a} \pm 7$	$19^{a} \pm 7$	$53^{b} \pm 7$	$32^{ab} \pm 7$	$26^{ab} \pm 7$	0.003	0.012	0.594
Indole	$21^{c} \pm 6$	$9^{ab} \pm 3$	$9^{ab} \pm 3$	$19^{cb} \pm 3$	$8^{ab} \pm 3$	$5^{a} \pm 2$	0.003	0.418	0.905

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Conclusions

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Thank You!