Effect of feed form and particle size on diet digestibility in pigs

Elizabeth Magowan

AFBI, Hillsborough, Northern Ireland

Introduction

- Pelleting has been found to improve the digestibility of feed in pigs (O'Doherty *et al*., 2000; Lundblad *et al*., 2011)
- Grinding the diet or dietary components to a fine particle size has also been found to improve nutrient digestibility (Lahaye *et al*., 2007 and 2008)
- However, the effect of pelleting in combination with fine grinding has not been thoroughly investigated

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Aim of study

To investigate the effect of offering finishing pigs a finely or coarsely ground diet in meal or pellet form on nutrient digestibility

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Experimental diet:

- One diet was formulated to contain 13.6 MJ/kg DE, 167 g/kg CP and 9.6 g/kg total lysine
- The diet contained(g/kg):

  Barley 412, Wheat 360,Soyabean meal 188, Limestone 13.3, Dicalcium Phosphate 7.6, Vegetable oil blend 10.0, Salt, minerals and vitamins, lysine, methionine, Phytase and NSP
- This diet was mixed and then processed as necessary to generate the various treatments

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Experimental details

In a 2 x 2 factorial design the treatments were :

- Feed form:
  - Meal
  - Pellets (steam pelleted)
- Particle size
  - Finely ground diet (reflective of compound feed)
  - Coarsely ground diet (reflective of ‘Home milled’ feed)

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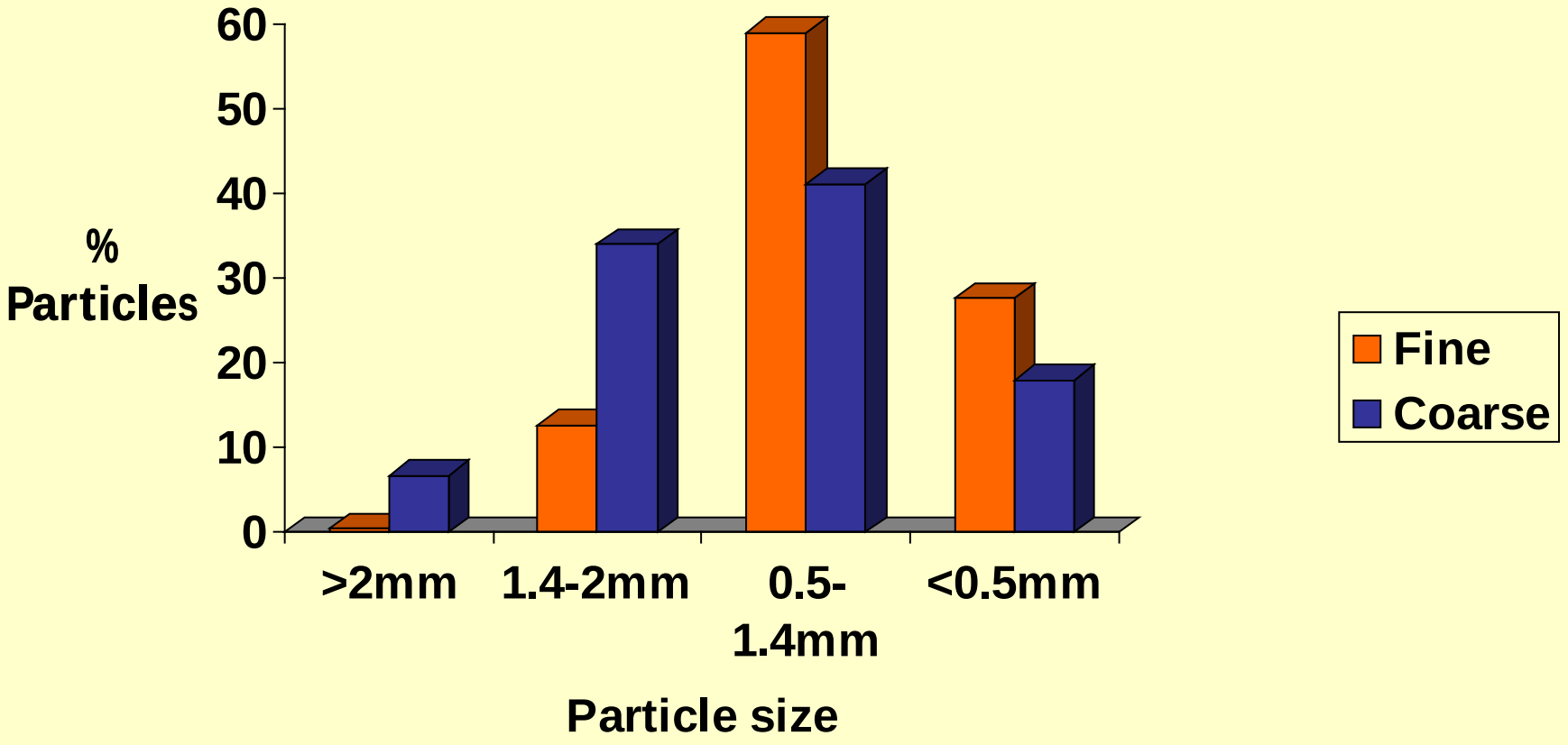
Particle size profile



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Experimental details

- 32 boars (PIC 337) used over 4 time periods
- 8 pigs/treatment
- Pigs had an average start weight of 45kg
- Pigs were housed in metabolism crates
- They received a 7 day pre-feed followed by a 7 day faecal and urine collection
- Digestibility of DM, CP, ash and energy was determined
- Dietary DE content was determined

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Effect of Feed Form

- NS (P>0.05) interaction

Digestibility of:	**Meal**	**Pellets**	**SEM**	**P value**
DM (%)	84.2	85.1	0.32	<0.05
Energy (%)	82.6	83.8	0.39	0.055
Crude protein (%)	82.1	83.4	0.63	>0.1
Ash (%)	59.2	61.2	0.79	0.084
Digestible energy content (MJ/kg DM)	15.2	15.4	0.07	<0.05

- Pelleting significantly improved DM digestibility and dietary DE content
- Pelleting tended to improve energy and ash digestibility

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Effect of particle size

Digestibility of :	Coarse	Fine	SEM	P value
DM (%)	84.2	85.1	0.32	0.051
Energy (%)	82.7	83.7	0.39	0.086
Crude protein (%)	81.5	84.0	0.63	<0.05
Ash (%)	59.3	61.1	0.79	>0.1
Digestible energy content (MJ/kg DM)	15.2	15.4	0.07	0.094

- Reducing particle size significantly improved CP digestibility
- Reducing particle size tended to improve DM and energy digestibility and digestible energy content of the diet

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Cumulative effect of pelleting and grinding?

	CP digestibility (%)	Energy digestibility (%)	Digestible energy content (MJ/kg DM)
Coarse Meal	80.7	81.7	15.02
Fine Meal	83.5	83.6	15.37
Coarse Pellet	82.3	83.7	15.44
Fine Pellet	84.4	83.9	15.45
SEM	0.90	0.56	0.10
P Value	<0.05	<0.05	<0.05

- 0.4 MJ/kg DM increase in DE content when the diet was manufactured as a ‘fine pellet’ compared to a ‘coarse meal’

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Summary

- Pelleting improved diet digestibility and dietary DE content
- Fine grinding improved CP digestibility and tended to improve DE content
- A cumulative beneficial effect of fine grinding and pelleting is suggested since the DE content, CP and energy digestibility of the diet were
  - optimised when the ‘fine pellet’ diet was offered but
  - poorest when the ‘coarse meal’ diet was offered.

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