Residual feed intake and feeding behaviour in group housed pigs

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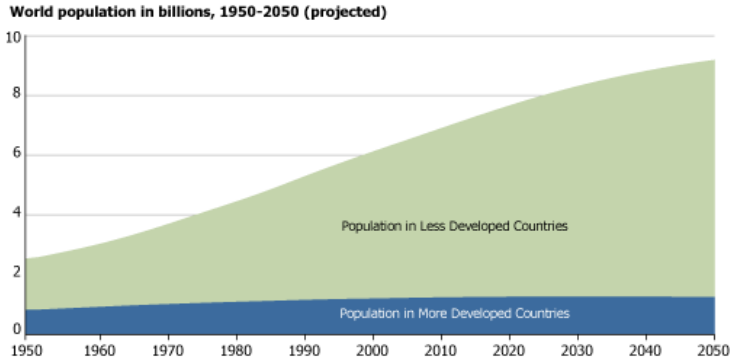
Background

- Increasing population
- Sustainable intensification
- **Feed efficiency**



United Nations, *World Population Prospects: The 2006 Revision* (2007).

- Many possible causes of variation
- Feeding behaviour one possibility
  - can affect digestive processes and energy usage
- Differences in feeding behaviour found between breeds and lines which differ in feed efficiency
- Research needed to examine variation in feed efficiency and feeding behaviour within populations of pigs

Aim and structure

Aim

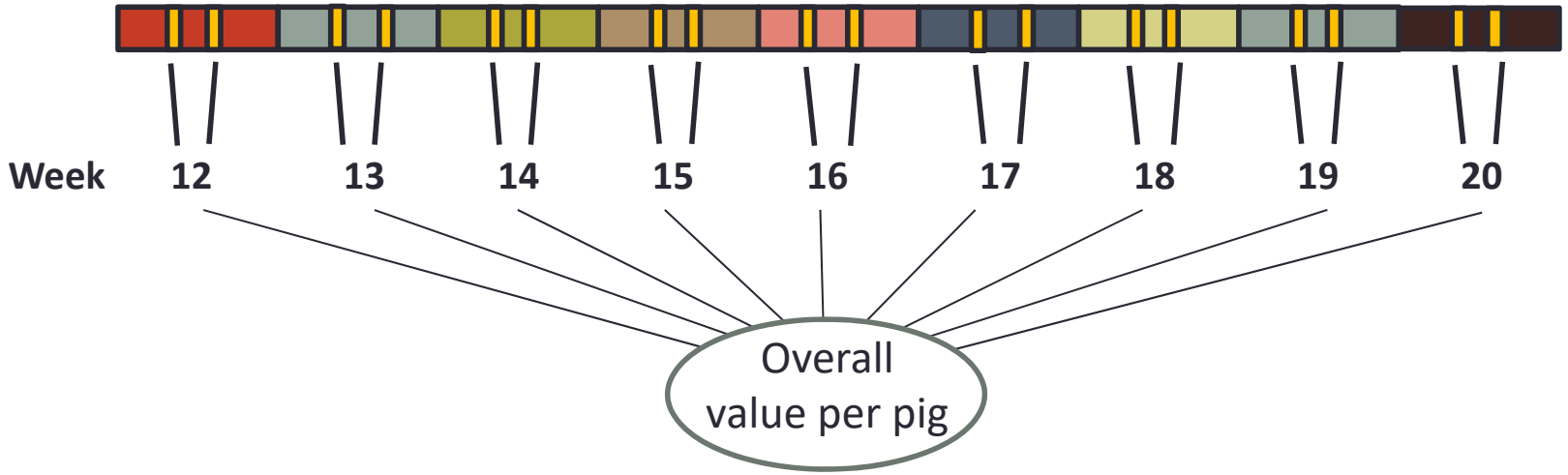
To investigate relationships between feed use efficiency and feeding behaviour in pigs housed in entire litter groups

Experimental design

- Used feeding data from existing study
- Three sites: Republic of Ireland, Northern Ireland, Austria.
- Similar genetics and common boars
- Same feed and similar management
- Some environmental differences – season and photoperiod

Methods

- Four batches on three sites, total 336 pigs
- Piglets were weaned at 28 days
- Finishing pigs housed in pens of 7-13 littermates
- Fed (*ad-lib*) through single space automatic feeders
- Intake data selected for 2 x 24h periods per week during weeks 12 - 20 of life
- Weekly values for each parameter were averaged



Methods

- Feed efficiency - RFI was calculated (from regression of ADFI on ADG, metabolic weight, gender, back fat, muscle depth, interactions)
- Within each pen the weights of M and F pigs were ranked separately and pigs were classed as ‘heaviest’, ‘medium’ or ‘lightest’ relative weight
- Data analysed using a REML linear mixed model
  - fixed model: RFI, gender, relative weight
  - random model: litter within batch and boar
- Four of the parameters were $\log_{10}$ transformed

Results

Table 1. Median values for overall feed intake parameters, coefficients for effect of RFI and significance of RFI in REML linear model

Feeding parameter	Median (inter quartile range)	Coefficient for RFI (95% CI)	P
Total feed intake in 24h (kg)	2.42 (0.47)	1.06 (0.87 – 1.24)	<0.01
Total time feeding in 24h (mins)	65.9 (19.4)	21.8 (11.3 – 32.3)	<0.01
Rate of feed intake (g/s)	0.57 (0.85)	0.15 (0.06 – 0.25)	<0.01

Higher RFI equates to lower efficiency

Less efficient pigs had:

- higher total intake and longer time feeding
- faster rate of feeding

Results

Table 1. Median values for feeding bout parameters, coefficients for effect of RFI and significance of RFI in REML linear model (log_{10} transformed parameters)

Feeding parameter	Median (inter quartile range)	Coefficient for RFI (95%CI)	P
Number of feeding bouts per 24h	15.4 (8.86)	0.17 (0.04 -0.29)	<0.01
Number of feeding bouts/kg feed	6.47 (3.93)	0.04 (-0.09 -0.16)	NS
Size of feeding bout (g)	172 (99.9)	0.01 (-0.12 – 0.13)	NS
Feeding bout duration (mins)	4.69 (2.51)	0.02 (-0.09 – 0.14)	NS

- Less efficient pigs had:
  - more feeding bouts in 24h but **not** more bouts per kg feed consumed
  - no difference in bout size or duration

Discussion

Intake and feeding activity

- Less efficient pigs had higher intake (excess over requirements reduces efficiency)
- Longer intake time and more bouts associated with this increased intake

- More bouts for less efficient animals, but not more bouts per kg - not spending more energy visiting feeder per kg consumed
- No difference in the characteristics of the feeding bouts

Discussion

Feeding rate

- Higher feeding rate not previously associated with poorer feed efficiency (Young et al., 2010)
- The current design allowed environment to be kept constant within litters; relative weight and gender included in the model

How could feeding rate affect RFI?

- Feeding more slowly might allow more thorough chewing?
- Slower feeding might allow more contact with digestive enzymes and the absorptive surface (de Haer & de Vries, 1993)?
- Slower feeding rate might reduce total intake (as in human research), therefore reducing RFI?

Implications and further work

- Differences in feeding rate between pigs with varying RFI
- This could differ between populations (batch differences)
- ***Might there be scope to improve RFI by manipulating feeding rate?***
- Further research is required – any manipulation to change rate could change productivity in other ways….

Ongoing work

- Links between feeding behaviour and weight of digestive tract and organs
- Examining the circadian pattern of feeding and links to RFI
- Feeding behaviour and live weight and back fat

Thank you

Any questions?

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References

de Haer, L.C.M. & de Vries, A.G., 1993. *Livestock Production Science* 36, 223-232

Young, J.M., Cai, W. & Dekkers, J.C.M., (2010). *Journal of Animal Science* 89, 639-647