



Pen-allocation strategies for uniform weights in finishing pigs

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PROBLEM

Variable performance of finishing pigs pens causes loss to producers through delayed availability of pen space and deviation from target market weight (120kg) [1,2].

- F1 - start of finishing phase (~20-30kg)
- F2 - end of finishing phase (~110-130kg)
- PTU - Pen-time use by F2
- DMT - Deviation from market target 120kg at F2
- A120 - age at 120kg (a trait)

Producer's approach: At F1, pigs are sorted to pens by similarity (e.g. weight) aiming at uniform weight at F2.

Problems

- Pigs judged similar at F1 still differ in weight by F2 [3].
- No variable at F1 is yet known to predict weight at F2.
- Value in improving allocation depends the selection variable at F1 and on market-dependent losses at F2.

Questions

- How much could losses be reduced?
- What would be the economic gain?

FINDINGS

- **Optimal strategy gain** - up to 28% (group av.+15%) in profit per pig; € 29000 per year in a 4000-pig farm
- **Producer's strategy** - the allocation used by farmers is not random, but can be improved. Improvement requires a direct or a proxy estimation of A120.
- **Random strategy** - leads more often to economic loss than profit compared to the producer's strategy.

Implications: Precision feeding will become more relevant in future systems where optimised pen sorting is applied from starter to grower to finisher.

In these systems it will be possible to give animals designed feed and treatment on a pen basis.

	Gr 1	Gr 2	Gr 3	Gr 4	Gr 5	Gr 6	Group mean
Annual loss in a 4000 pig farm (€year)	12,325	28,925	24,024	12,200	36,249	32,250	24,324
PS							
RS	30,725 (20275, 34230)	2,700 (20750, 27175)	27,400 (19350, 38900)	15,150 (9700, 18175)	32,950 (20600, 40650)	27,000 (19700, 31350)	22,654
DS	8,328	7,584	12,984	7,056	6,432	9,024	8,568
IS gain relative to PS:							
%	-14%	6.6%	-9.5%	-24.2%	9.1%	16.3%	-25.1%
4000-pig farm (€year)	-18,400	1,925	-2,375	-2,850	3,300	5,000	-2,250
per pig (€)	-4.6	0.5	-0.6	-0.7	0.8	1.3	-0.6
% of av. pig profit	-18%	2%	-2%	-3%	3%	5%	-2%
OS gain relative to PS:							
%	29.6%	72.7%	46.0%	39.8%	81.5%	70.9%	64.8%
4000-pig farm (€year)	3,504	20,184	11,040	4,656	28,370	21,936	14,948
per pig (€)	0.88	5.05	2.76	1.16	7.09	5.48	3.74
% of av. pig profit	3.5%	20.2%	11.0%	4.7%	28.4%	21.9%	15.0%

APPROACH

Hindcast analysis using finishing weights and estimated A120 (age at 120kg)

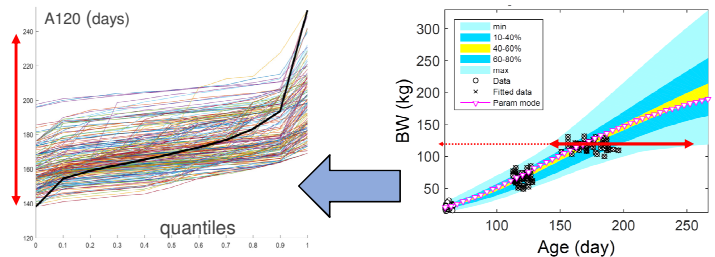
Data: 240 pigs

- 6 contemporary groups (specific line and diet),
- 3 weight measurements (22±5, 65.3±15, 120.3±13 kg, mean ± 2sd).

Group of contemporaries	Line and diet	no. pens	no. pigs	no. pigs/pen	Boars/Gilts	A B
1	A, Std	4	25	7 8 5 5	13 12	25 0
2	A, Std	4	40	10 10 10 10	20 20	40 0
3	B, Std	4	39	10 10 9 10	19 20	0 39
4	B, Std	4	25	5 7 6 7	12 13	0 25
5	A, B, other	8	54	7 7 9 8 4 6 6 7	27 27	7 47
6	A, B, other	8	57	9 4 7 10 4 8 9 6	31 26	20 37
		32	240		122 118	92 138

Bayesian individual-based estimation:

Estimate A120 from inferred growth curve per individual



Pen allocation strategies:

- **'Optimal' strategy** – pens have contemporary pigs with similar A120
- **Producer's strategy** – pen occupation as known
- **'Random' strategy** – pens have contemporary pigs with randomly sorted A120

Simulation of strategies using estimated A120

Calculation of economic gain = difference in loss (PTU+DMT) in relation to Producer's strategy, at current market values.

References

1. Tokach M (2004) Dealing with variation in market weight; Ball R, editor. Edmonton: University Alberta Dept Agr, Food & Nutr Sci. 281-290 p.
2. The Pig Site (2015) Increasing Uniformity of Finished Pigs. <http://www.thepigsite.com/articles/5142/increasing-uniformity-of-finished-pigs/>
3. O'Quinn PR, Dritz SS, Goodband RD, Tokach MD, Swanson JC, et al. (2001) Sorting growing-finishing pigs by weight fails to improve growth performance or weight variation. Journal of Swine Health and Production 9: 11-16.

Feed-a-Gene

Feed-a-Gene is a European H2020 project involving 23 partners which aims to adapt feeds, animals and feeding techniques to improve the efficiency and sustainability of pig, poultry and rabbit production systems. It is coordinated by INRA (France), started in March 2015 and will last 5 years. The project aims to reduce the environmental impact of monogastric livestock production by improving and diversifying animal diets and feed technologies and by integrating new selection criteria for these animals. The Feed-a-gene project further aims to develop new management systems for precision feeding and precision farming and to evaluate the overall sustainability of the different management solutions proposed in the project.



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