

Dynamic precision feeding of growing pigs using a new automatic feeder linked to a weighing station

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Within a batch, pigs are from different genders and a variability in growth potential and body weight (BW) exists. It is associated with a high variability in nutrient requirements among pigs, but also a high variability in change of nutrient requirements with time. In most commercial piggeries, a phase feeding is used. Over rather long periods, the dietary nutritional characteristics are kept constant. Based on the requirement of most demanding pigs, nutrient supplies excess requirements for most of the pigs. In order to reduce feed cost and environmental impact of pig production, precision feeding concept has been developed for 15 years, especially in Spain and Canada. To adjust both quantity and quality of the diet delivered to each pig in the group, a precision feeder is required that identifies and weighs the animal, and blends at least two diets. Most available systems have been developed in ad libitum feeding conditions. In France most of the pigs are restrictively fed, then an automatic feeder has been designed and tested in the IFIP experimental farm (Romillé, France) that allows for restricting feeding level.

The system

Precision feeder

- 5 electronic feed dispensers (EFD) / 96 pigs (ear tag)
- Identification (ear tag) → feeding strategy
- 1 pig per EFD → individual feeding
- Mix of 2 diets A/B → multiphase feeding
- Minimum amount of diet A or B delivered: 30 g

Weighing sorting station

- Daily feed intake < max. feed allowance and at least one EFD is free → access to the feed area
- Maximum feed allowance reached → return to the life area
- Depending on the farmer's choice → go to the sorting pen

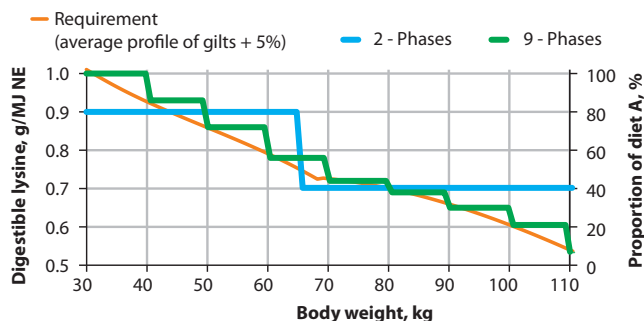
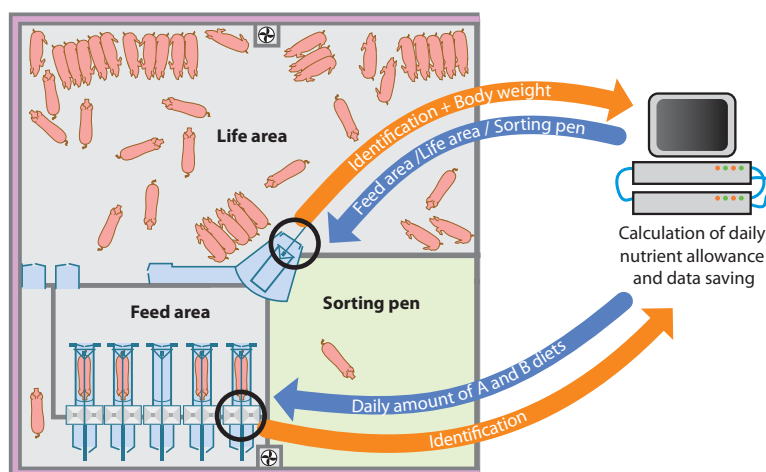


Figure 1: Feeding strategies studied (2- or 9-phases), compared to requirement of gilts (Quiniou et al., 2013)

Table 1: Preliminary results

Number of phases	2	9	RSD	P
Number of pigs	40	31		
Feed intake, kg/d	2.14	2.13	0.06	0.30
Cumulated N intake, kg	4.69	4.61	0.19	0.06
Average daily gain, g	786	773	50	0.26
Feed conversion ratio	2.73	2.76	0.17	0.57
Carcass leanness, %	59.7	60.1	1.6	0.27

RSD: residual standard deviation; P-value for the effect of the feeding strategy (proc GLM, SAS v9.2)

The test

Adaptation period

- 9 days

Restricted feed allowance

- Feed allowance on first Day 1: 4% of individual BW
- Following days: +27 g/d up to 2.4 (gilts) or 2.7 (barrows) kg/d

Feed sequence plan (figure 1)

- Digestible lysine: 1.0 (A) / 0.5 (B) g/MJ net energy (9.75 MJ/kg)
- 2-phases strategy: %A changes when average BW > 65 kg
- 9-phases strategy: %A changes individually per 10 kg BW range

Results

- At the end of the adaptation period: 4 unadapted pigs → removed
- At the end of the test: 14 pigs with more than 4 days without feed intake
- Good correlation between automatic and manual BW measurements

Age, d		77	110	145	172	179
BW, kg	Manual	33.0	58.9	88.9	107.2	108.0
	Automatic	33.0	58.8	89.2	108.9	109.1
Coefficient of correlation		0.94	0.94	0.99	0.97	1.00

- Growth performance (table 1) are similar with both strategies, but N intake tended to be reduced with the 9-phases one.



Conclusion

For pigs who do not cope with the system from the beginning, an additional small pen equipped with conventional feeding system must be considered in the conception of the device. Adaptations are required to limit days without feed intake, like extra water supply in the trough.

During the test, the daily feed allowance was adapted to each pig at the beginning of the growing phase, but its quality was based on fixed proportions of A/B diets depending only on BW. In the next trial, precision feeding will be improved through consideration of individual growth potential and precocity, and their consequences on daily requirement.