



A decision support tool for sustainable swine nutrition

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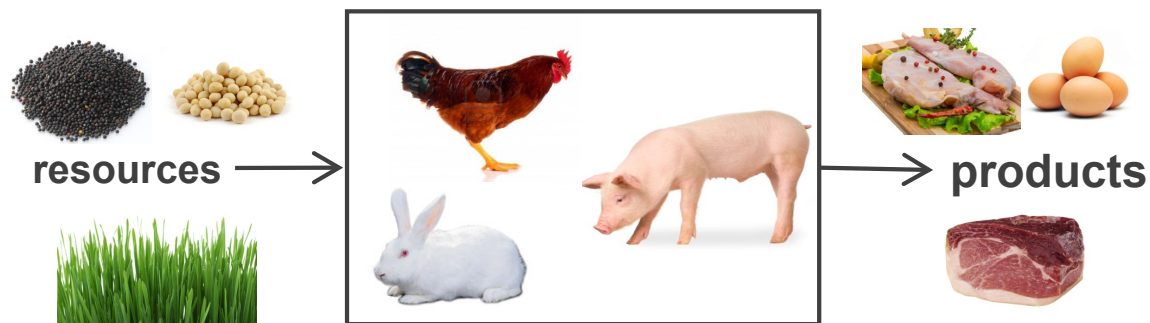
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Adapting the **feed**, the **animal** and the **feeding techniques** to improve the efficiency and sustainability of monogastric livestock production systems

Feed-a-Gene research program aims to **better adapt** different components of monogastric livestock production systems (pigs, poultry and rabbits) to improve the **overall efficiency** of these systems, to **reduce their environmental impact**, and to enhance **food security** whilst maintaining food quality.





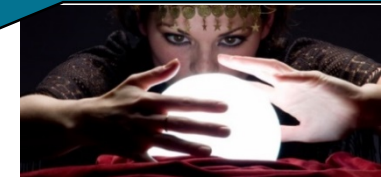
Modelling working package

- Develop biological models of livestock functioning to better understand and predict nutrient and energy utilization of animals along their productive trajectory and, based on these, develop Decision Support Systems.

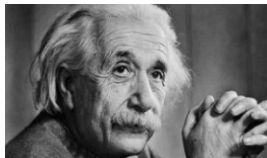
Observe variation in feeds, animals, and the environment



Predict using data-driven models and quantify interactions and variation



Understand the underlying mechanisms of variation



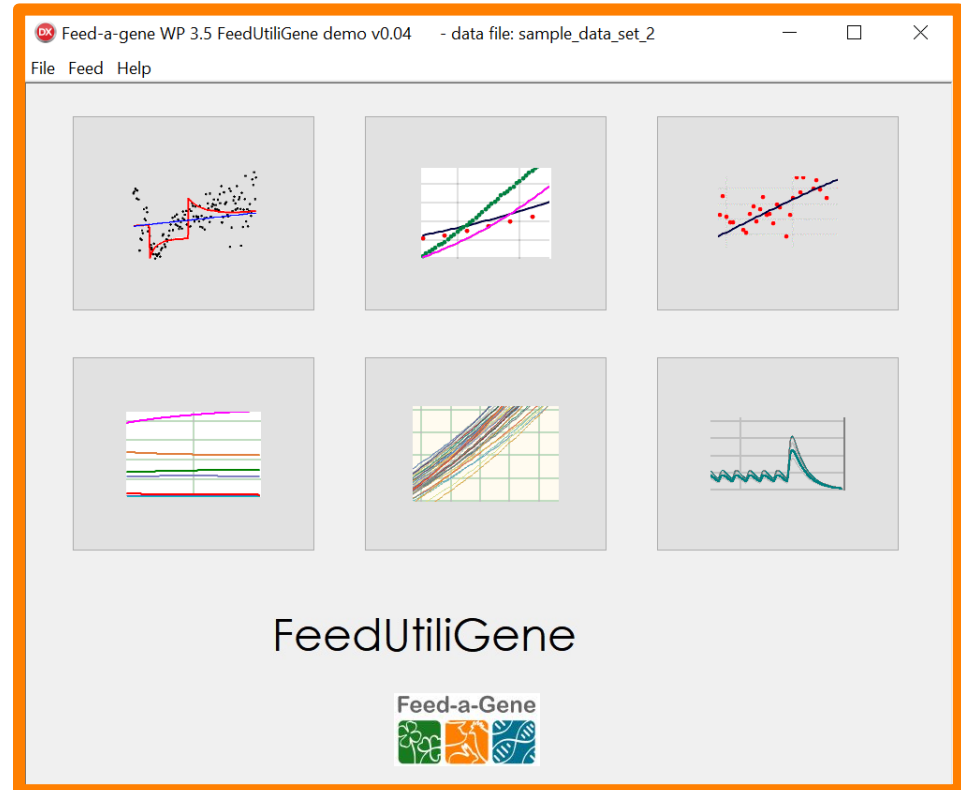
Control through livestock management (e.g., feeding, breeding)





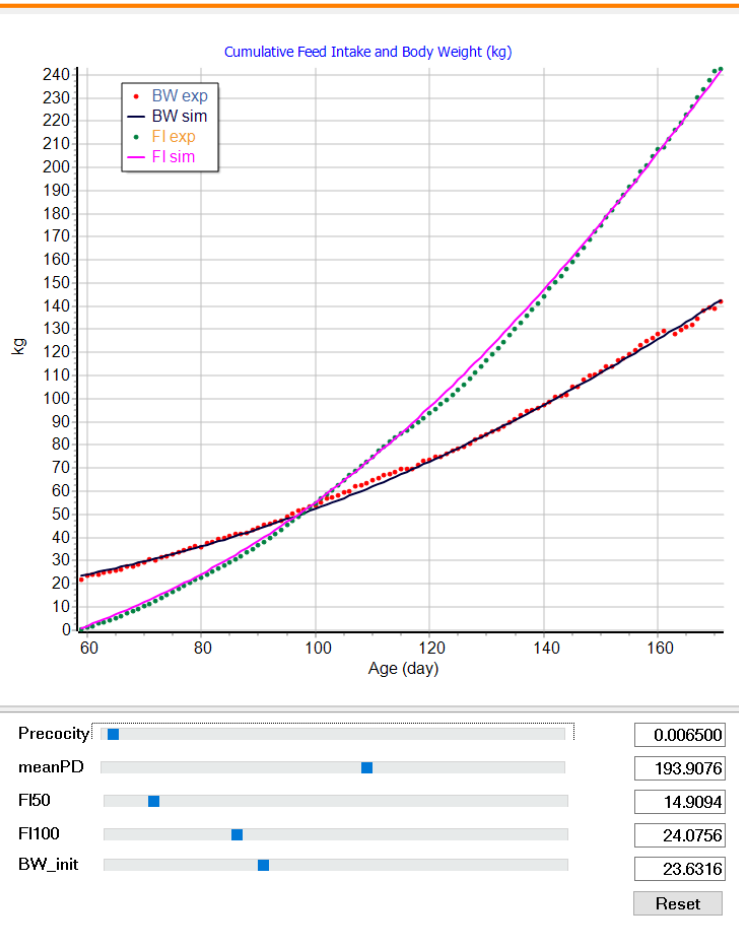
Aim of the presentation

- ▶ Illustrate the application of our model that predicts the nutrient partitioning in growing and fattening pigs.
- ▶ Demonstrate that *FeedUtiliGene* software can be a useful tool to study the animal response to dietary and some environmental factors.

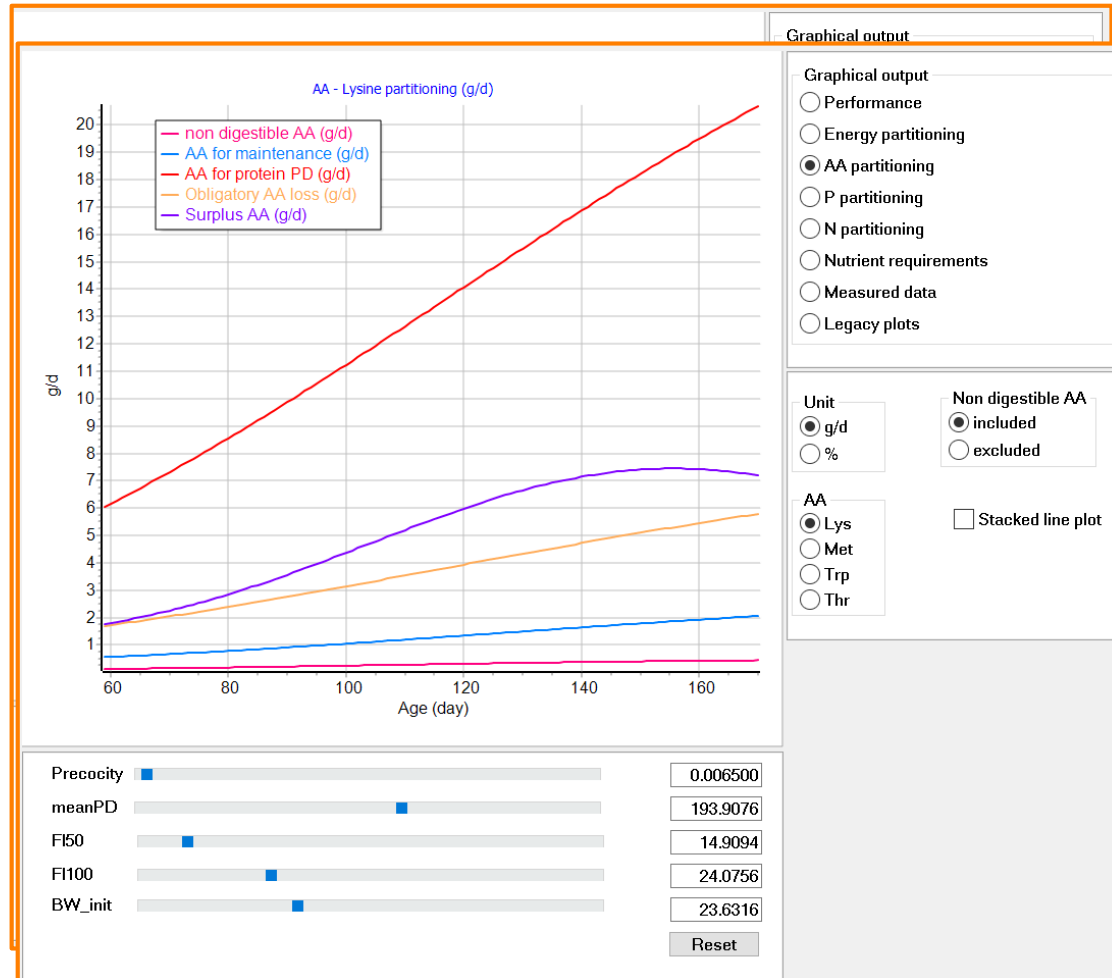




Parameter estimation



Diagnostic tool





Case study 1: Minimize N excretion

FI-BW FI-BW FI-BW data file

Feed s Feed s Feed sequence

Feed Sequence and Feed Composition Tool

body weigh kg body weigh kg

	Diet 1		Diet 2		Diet 3	
Crude protein	150.69	86.1	130.79	86.1	124.78	86.1
Lysine	12.23	89.0	9.20	89.0	9.44	89.0
Methionine	3.49	91.3	2.99	91.3	2.79	91.3
Tryptophan	2.73	88.5	1.83	88.5	1.70	88.5
Threonine	8.21	86.2	6.68	86.2	10.35	86.2
kAA multiplier	<input type="text" value="1.00"/>					
Ca	<input type="text" value="10.77"/>	<input type="text" value="10.77"/>	<input type="text" value="10.77"/>	<input type="text" value="10.77"/>	<input type="text" value="10.77"/>	<input type="text" value="10.77"/>
P <input type="checkbox"/>	<input type="text" value="7.19"/>	<input type="text" value="7.19"/>	<input type="text" value="7.19"/>	<input type="text" value="7.19"/>	<input type="text" value="7.19"/>	<input type="text" value="7.19"/>

Lysine

N partitioning (g/d)

Precocity

meanPD

FI50

FI100

BW_init



Case study 2: Performance in heat stress

Ac	Age	°C
1	59	20
2	60	20
3	61	20
4	62	20
5	63	20
6	64	20
7	65	20
8	66	20
9	67	20
10	68	20
11	69	24
12	70	24
13	71	24
14	72	24
15	73	24
16	74	24
17	75	26
18	76	26
19	77	26
20	78	26
21	79	26
22	80	20
23	81	20
24	82	20
25	83	20
26	84	20
27	85	20
28	86	20
29	87	20
30	88	20
31	89	20
32	90	20
33	91	20
34	92	20

Temperature effect active

Set all range

Temperature: Set values

Set temperature range

Age range:

Temperature range:

Set values

Reset

Animal List
Temperature
Feed Composition

FI-BW data file:

Feed sequence: Single High CP

Precocity: 0.006500

meanPD: 193.9076

FI50: 14.9094

FI100: 25.8613

BW_init: 23.6316

Reset



Conclusion

- ▶ *FeedUtiliGene* is a useful demonstration tool to study the response of a pig to different feeding schedule and ambient temperature.
- ▶ With some adaptation the model might be appropriate to be included in precision feeding systems.

Implication

Precision livestock farming and nutrition has a great potential to contribute to more sustainable animal production systems.



Thank you for your attention!

EU
funded
Research
project

Feed-a-Gene



23
Partners
EU + China

2015
2020

Adapting the **feed**, the **animal** and the **feeding techniques** to improve the efficiency and sustainability of monogastric livestock production systems.
(www.feed-a-gene.eu)

15
Industry

€10 M
Budget



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Academic