



 Never Stop Improving

Nutritional factors associated with abnormal behaviors in pigs

PIC Global Nutrition Team

June 23rd, 2020

PIC[®]

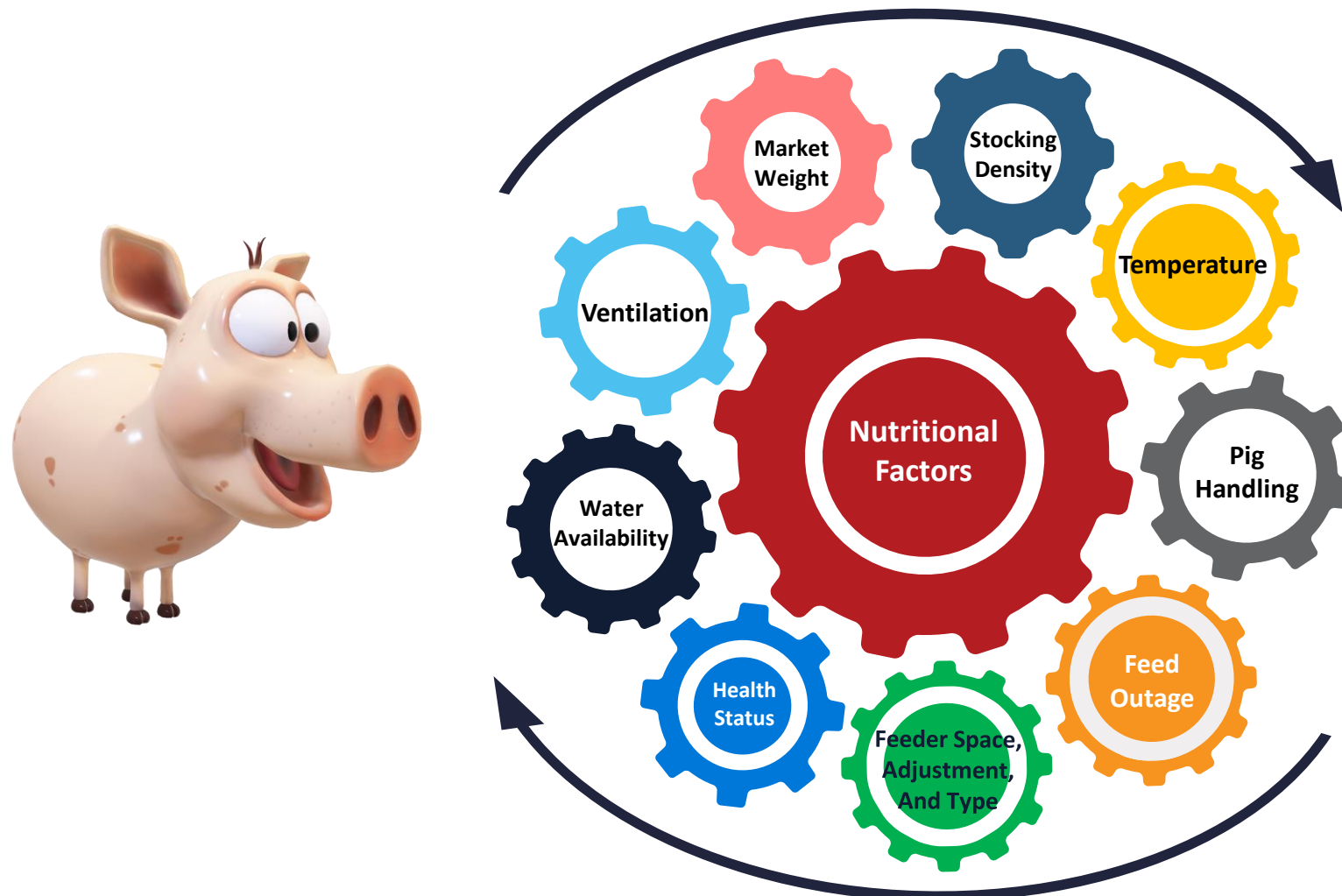
Happy Pig

Adequate nutrient access depends on multiple factors:



Happy Pig

Adequate nutrient access depends on multiple factors:



Nutritional factors:

Review the nutrition program

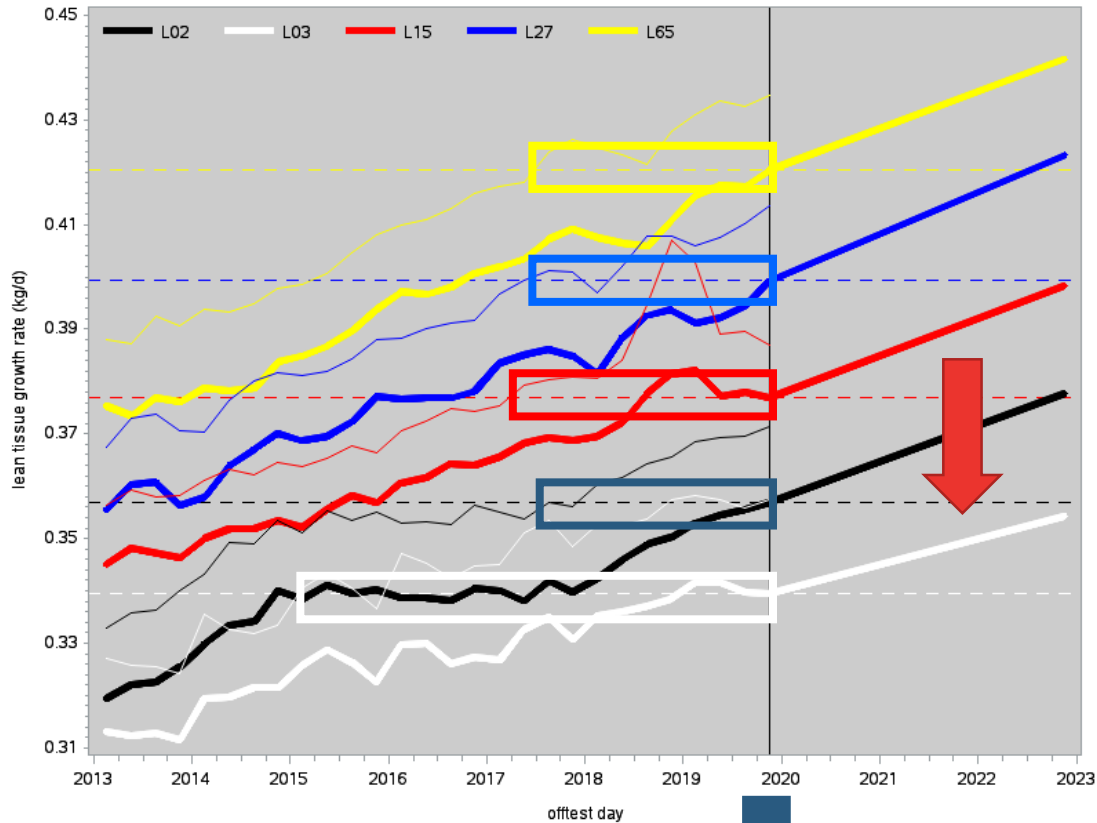
- ✓ Sodium deficiency (salt);
 - ✓ Contaminants including mycotoxins and peroxides (fat/oil stability);
 - ✓ Diets limiting in phosphorus;
 - ✓ Relief products:
 - ✓ MgO, mycotoxins binders, Na metabisulfite, capsicum “pepper”, apple cider vinegar, extra salt, “blocks”;
- ✓ Protein deficiency and/or amino acids imbalance;
 - ✓ High fiber associated with low energy diets;
 - ✓ High energy levels (fat) in combination with low amino acids levels.

Do pigs grow because they eat

or

Eat because they grow?

Lean tissue growth rate (LTGR) = 0.75 x ADG x % lean



GENETIC TRENDS

Bold line: population mean
Thin line: top 25% of the population

Timeline for the LTGR of average of top 25% become the population average

L65	3 years
L27	3 years
L15	3,5 years
L03	5 years
L02	3 years

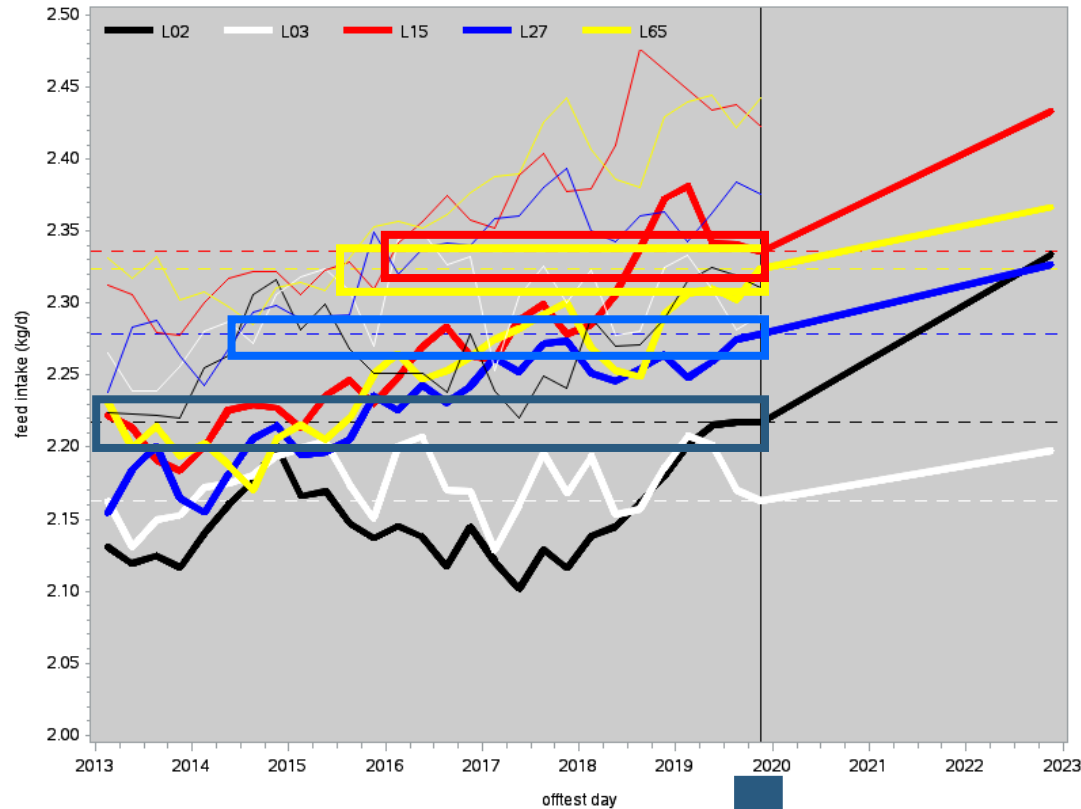
Realized genetic trend



Predicted genetic trend

May 16, 2020

Feed intake recorded in performance testing from 30 to 120 kg



GENETIC TRENDS

Bold line: population mean
Thin line: top 25% of the population

Timeline for the LTGR of average of top 25% become the population average

L65	5 years
L27	5,5 years
L15	4 years
L03	>6 years
L02	>6 years

Realized genetic trend

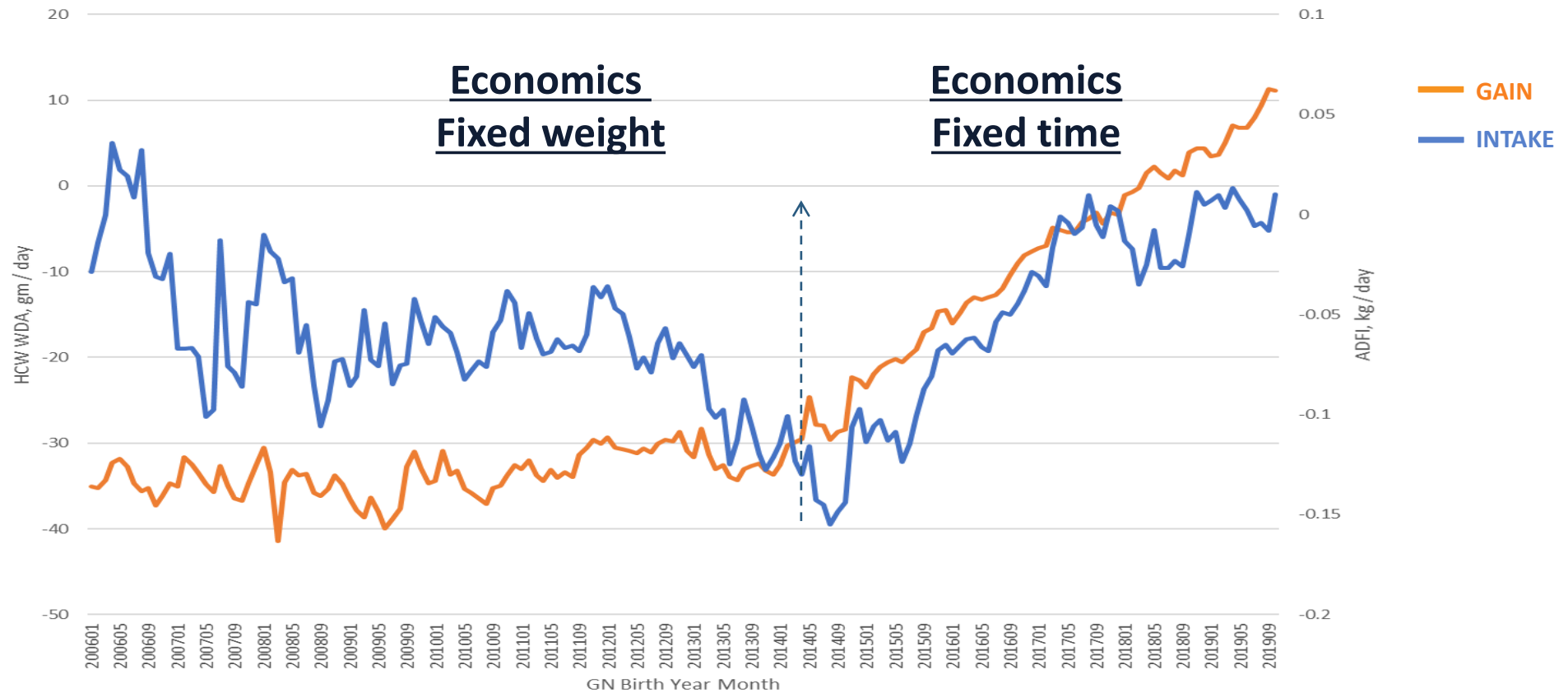


Predicted genetic trend

May 16, 2020

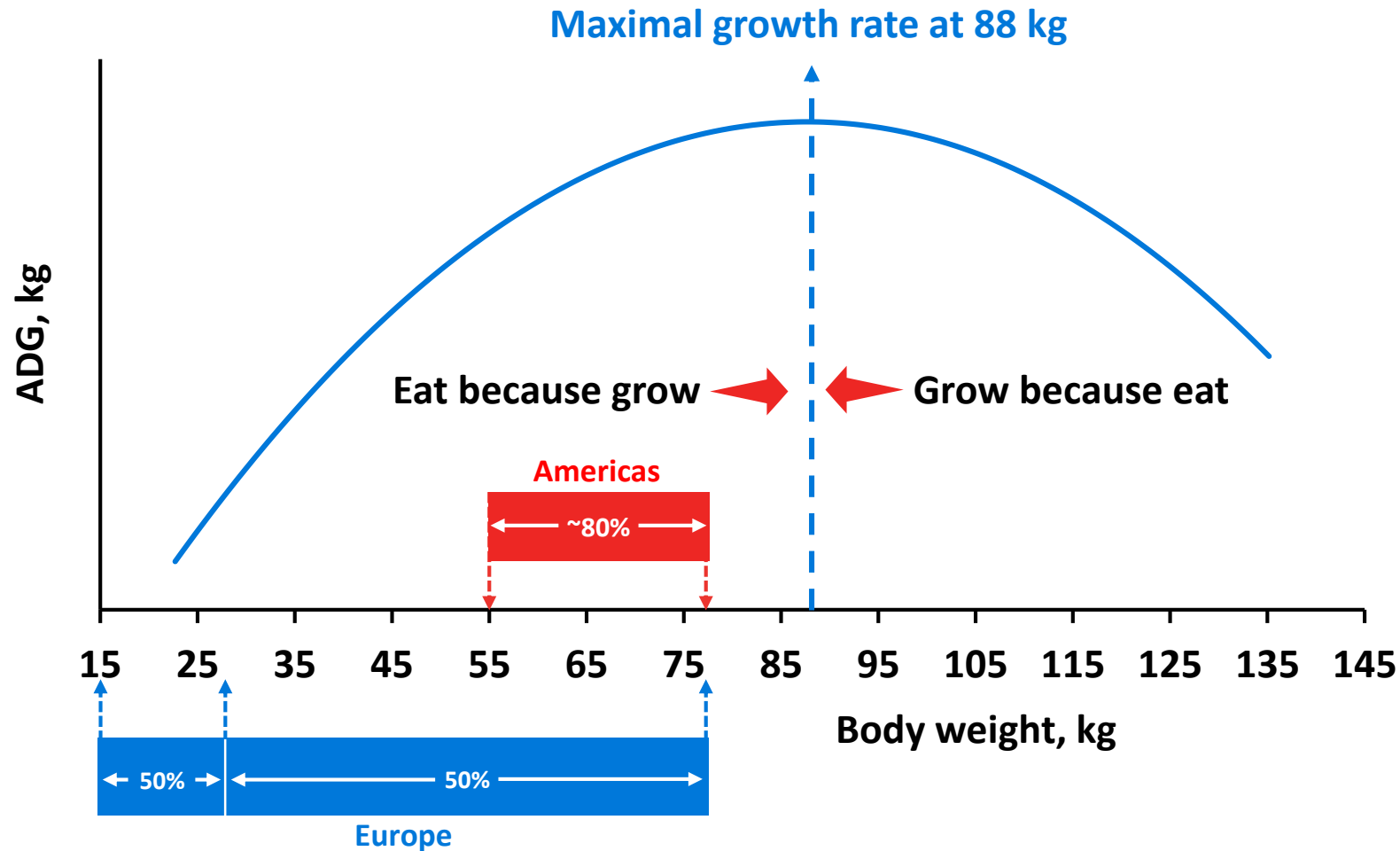
Genetic development and nutrient requirements changes:

Improvement in F:G since 2006 for L65



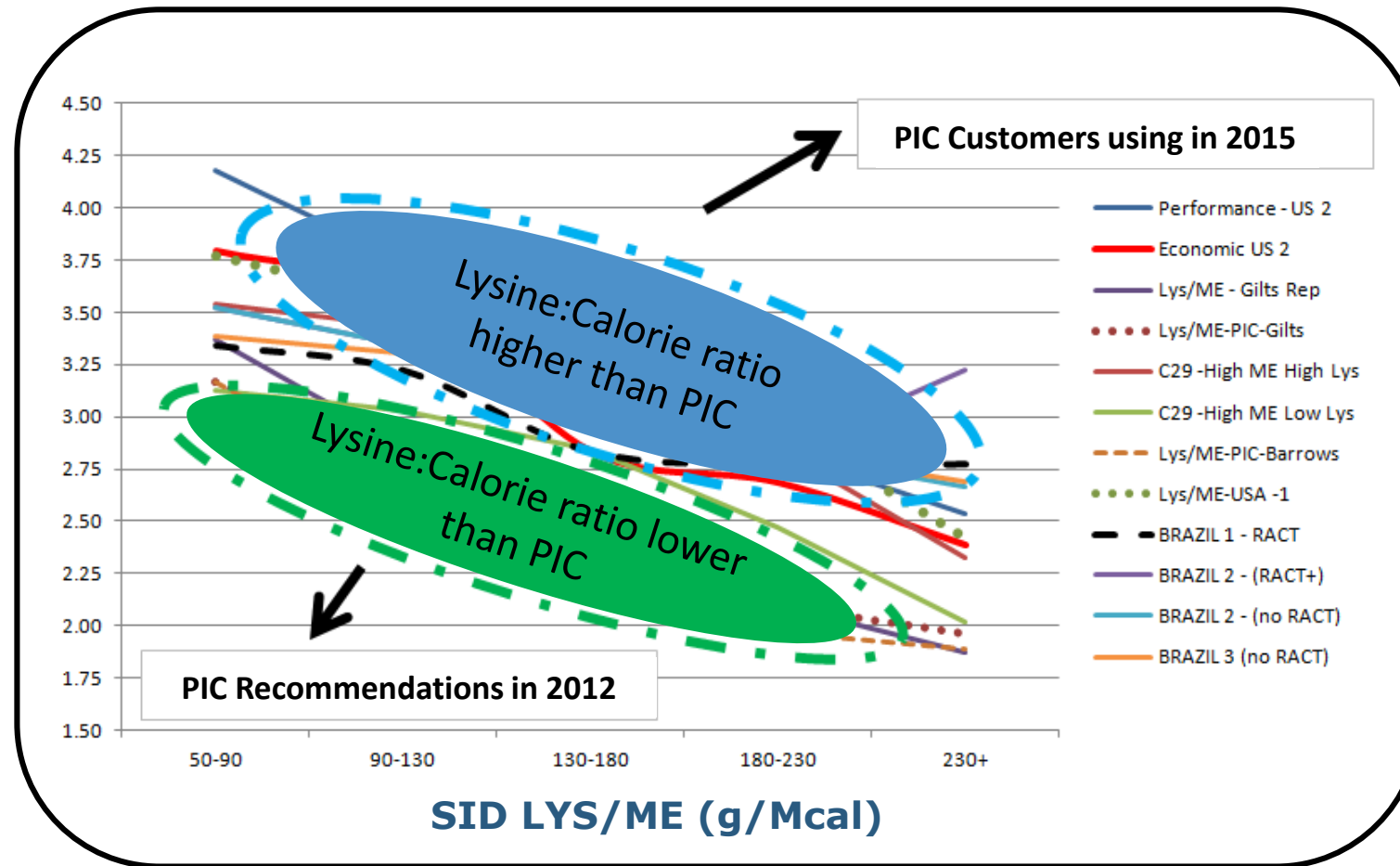
Growth curve:

Eat to grow OR growth because they eat?



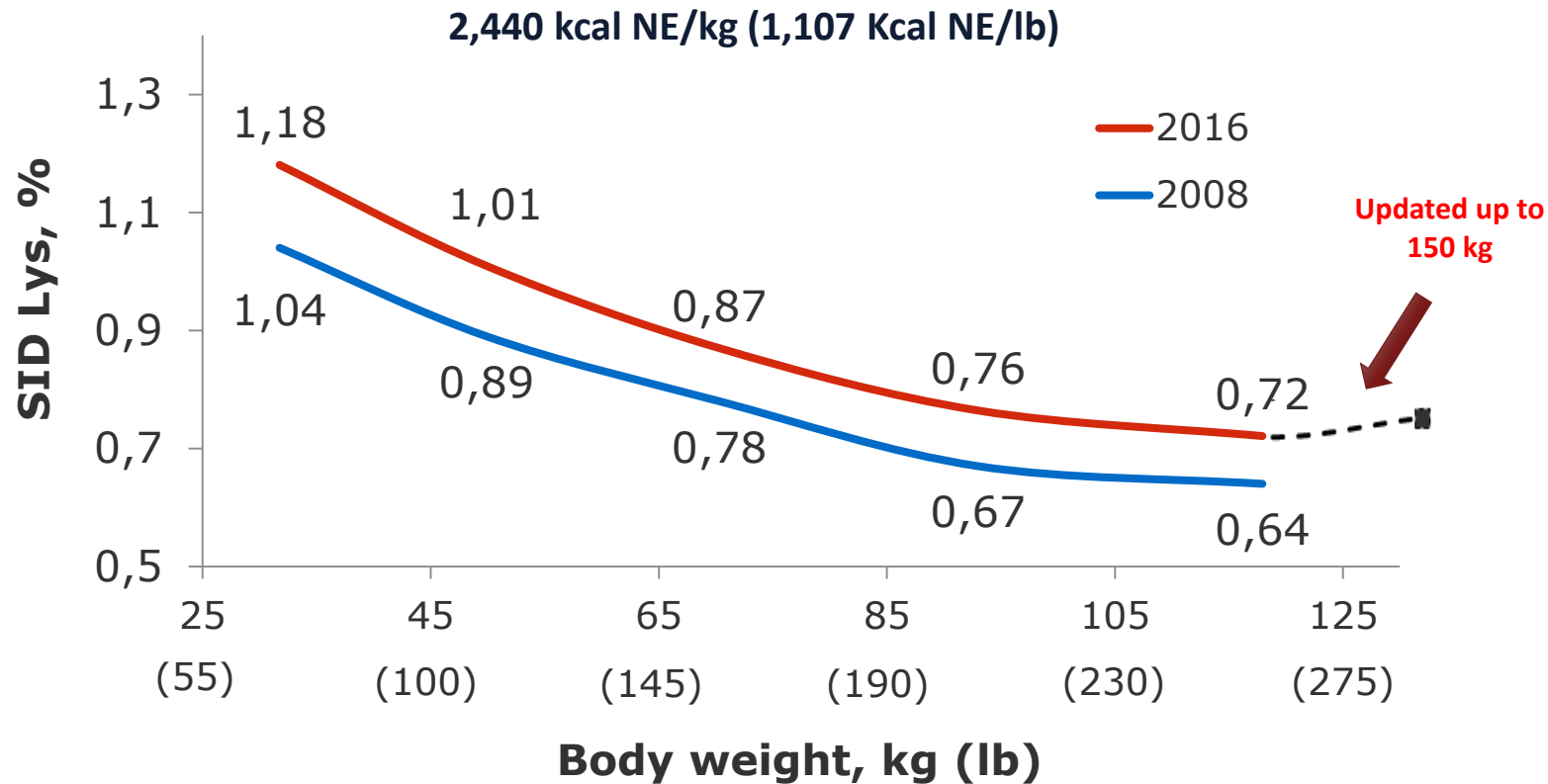
Nutritional factors:

Review in SID Lys to energy ration in April 2015



Nutritional factors:

Meta-analysis: Amino acid requirements

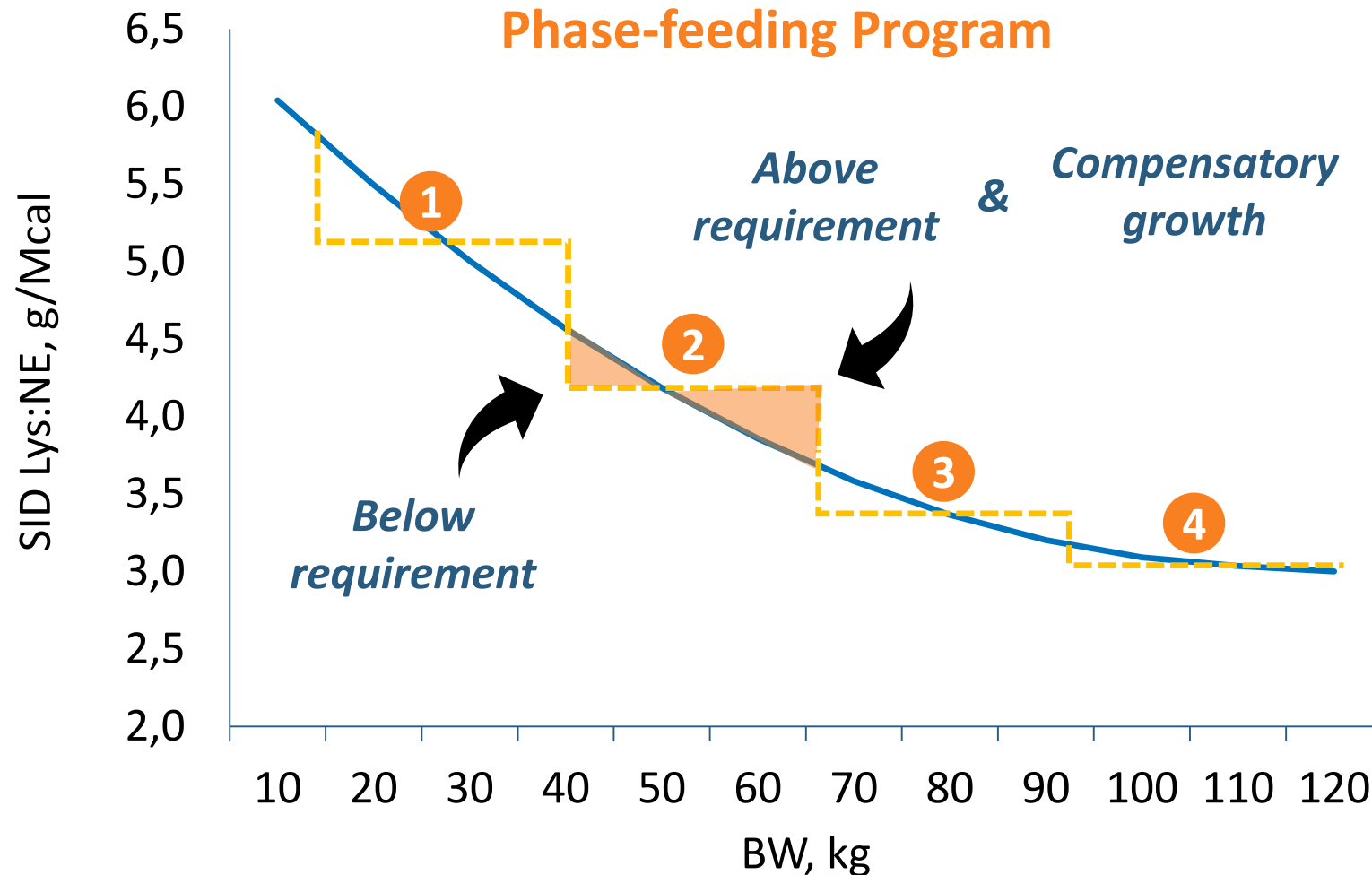


28 commercial experiments, with a total of 46,092 pigs.

Average of barrows and gilts, average of ADG and F/G.

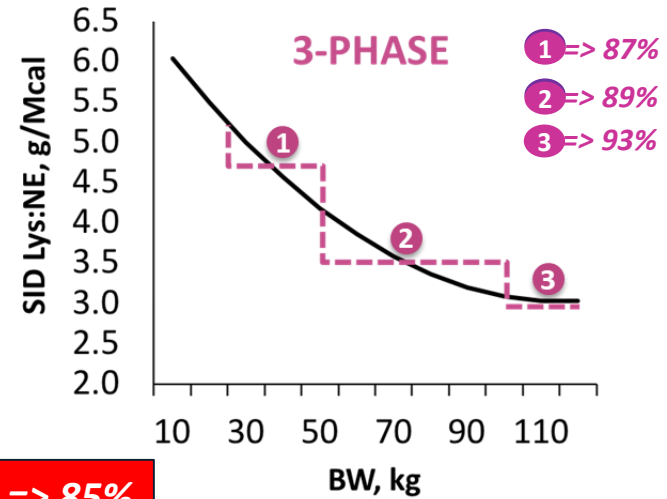
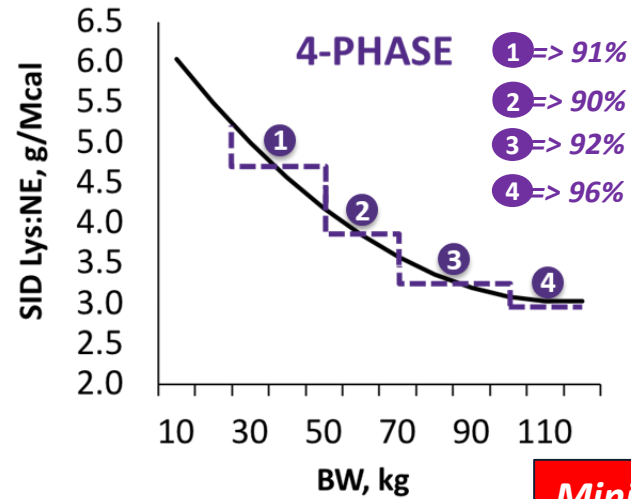
Nutritional factors:

Curve of SID Lys to energy ratio

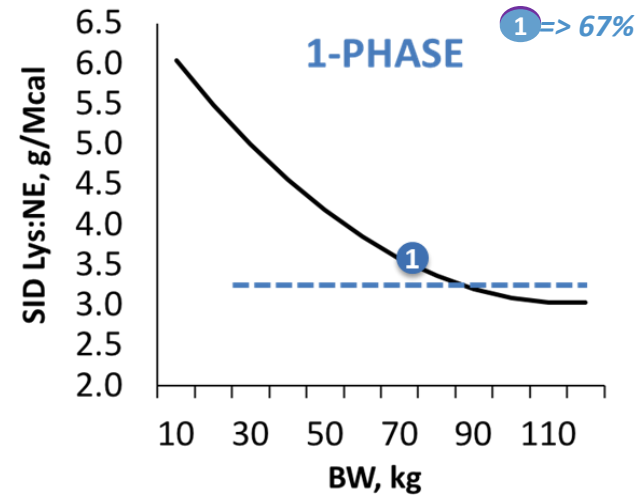
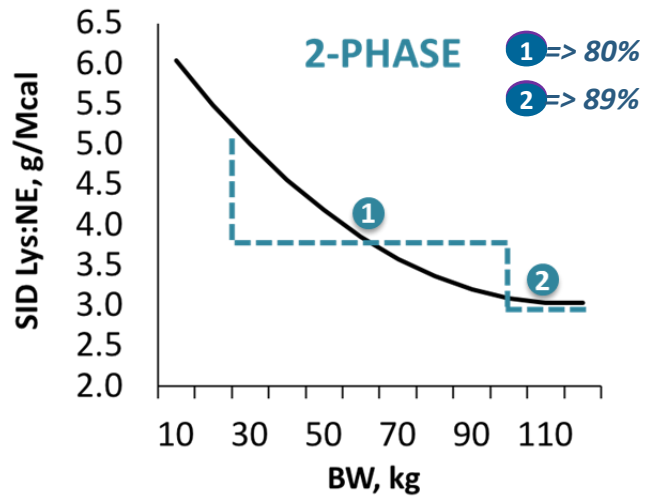


Nutritional factors:

Impact of phase feeding

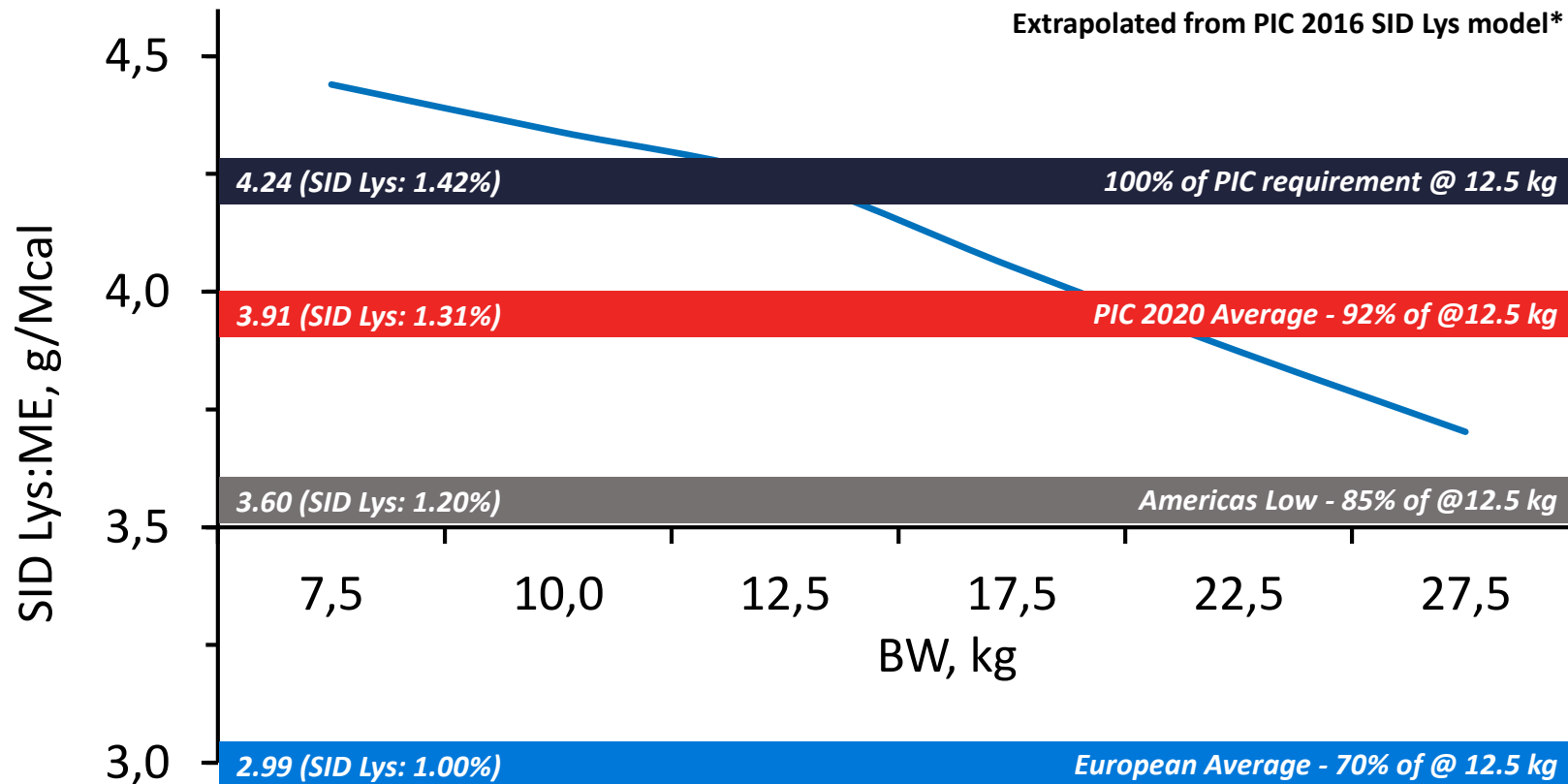


Minimum => 85%



Nutritional factors:

Amino acids in late nursery phase (12.5 – 25.0 kg)



* Assuming 3,350 Kcal of ME/kg of diet

Impact of phase feeding: on SID Lys requirements



	Phase Feeding	Weight-specific Requirements		
		at 23 kg	at 49 kg	at 75 kg
Energy level, NRC ME kcal/kg	3230	3230	3230	3230
Weight In, kg	23	23	49	75
Weight Out, kg	75	23	49	75
SID Lys:Cal ME Barrows and Gilts	3.07	3.86	3.07	2.53
Phase feeding versus weight-specific requirement		80%	100%	121%

**PIC recommends
Minimum of 85%**

How can we reduce the risk of abnormal behavior? **Impact of phase feeding**



Weight Specific Requirements

at 23 kg at 60 kg at 75 kg

Energy level, NRC ME kcal/kg	3230	3230	3230
Weight In, kg	23	60	75
Weight Out, kg	23	60	75

SID Lys:Cal ME
Barrows and Gilts

3.86	2.81	2.53
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Phase Feeding Ratio versus 23 kg
Phase Feeding Ratio versus 60 or 75 kg

Phase Feeding Requirements

23 to 75 kg

across phase mean weight

3230	3230
23	49
75	49

3.07	3.07
------	------

80%

121%

23 to 60 kg

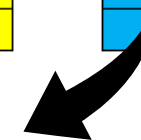
across phase mean weight

3230	3230
23	42
60	42

3.27	3.27
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85%

116%



PIC recommends Minimum of 85%

Nutritional factors:

Amino acids intake: SID Tryptophan

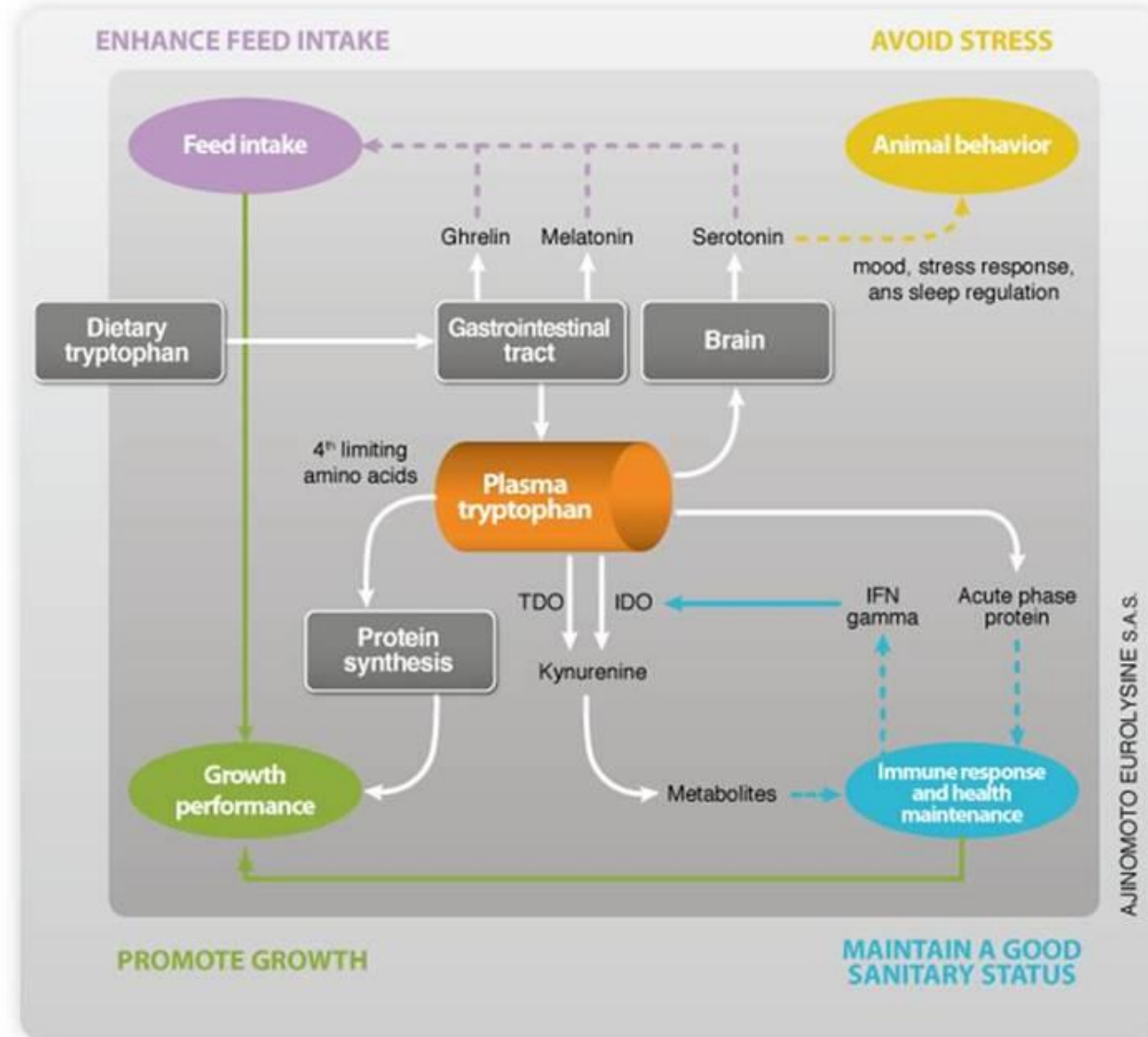
	PIC 2020	European diets
	100% of PIC 2020 req.*	Under PIC Lys req.*
Dietary amino acids (Barrows and gilts)		
SID Lys , %	1.31	1.00
SID Trp:Lys ratio, %	20	20
Growth performance (d 45 -63)		
Weight in (d 45), kg	12.5	12.5
ADFI, g/d	982	976
ADG, g/d	684	650
Feed:Gain ratio	1.435	1.502

TRP is not only about gain or intake

Nutritional factors:

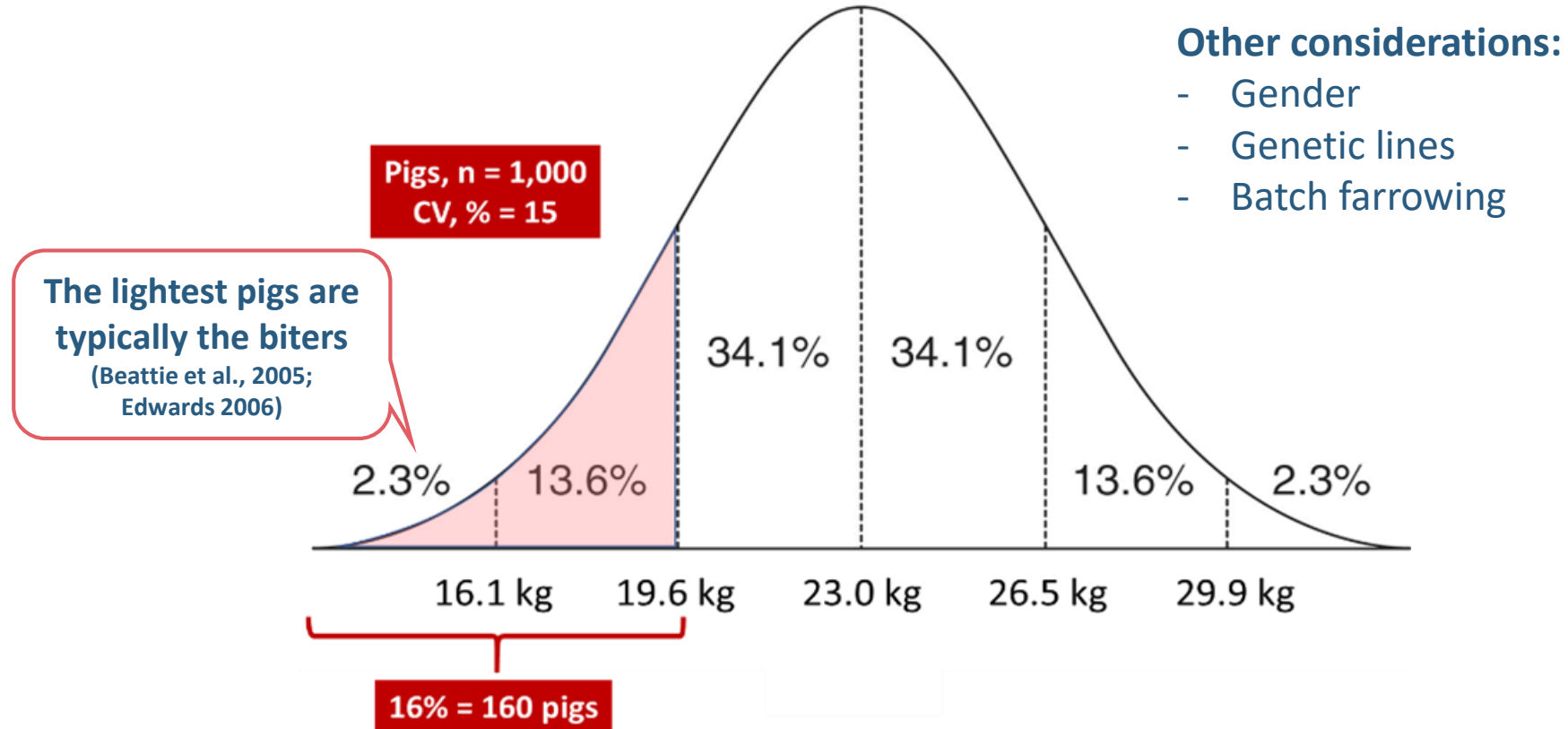
Role of Tryptophan in animal behavior

An update in our recommendation for TRP/LYS ratio is the issue for our 1st Nutritional Technical Bulletin in 2015



How can we reduce the risk of abnormal behavior?

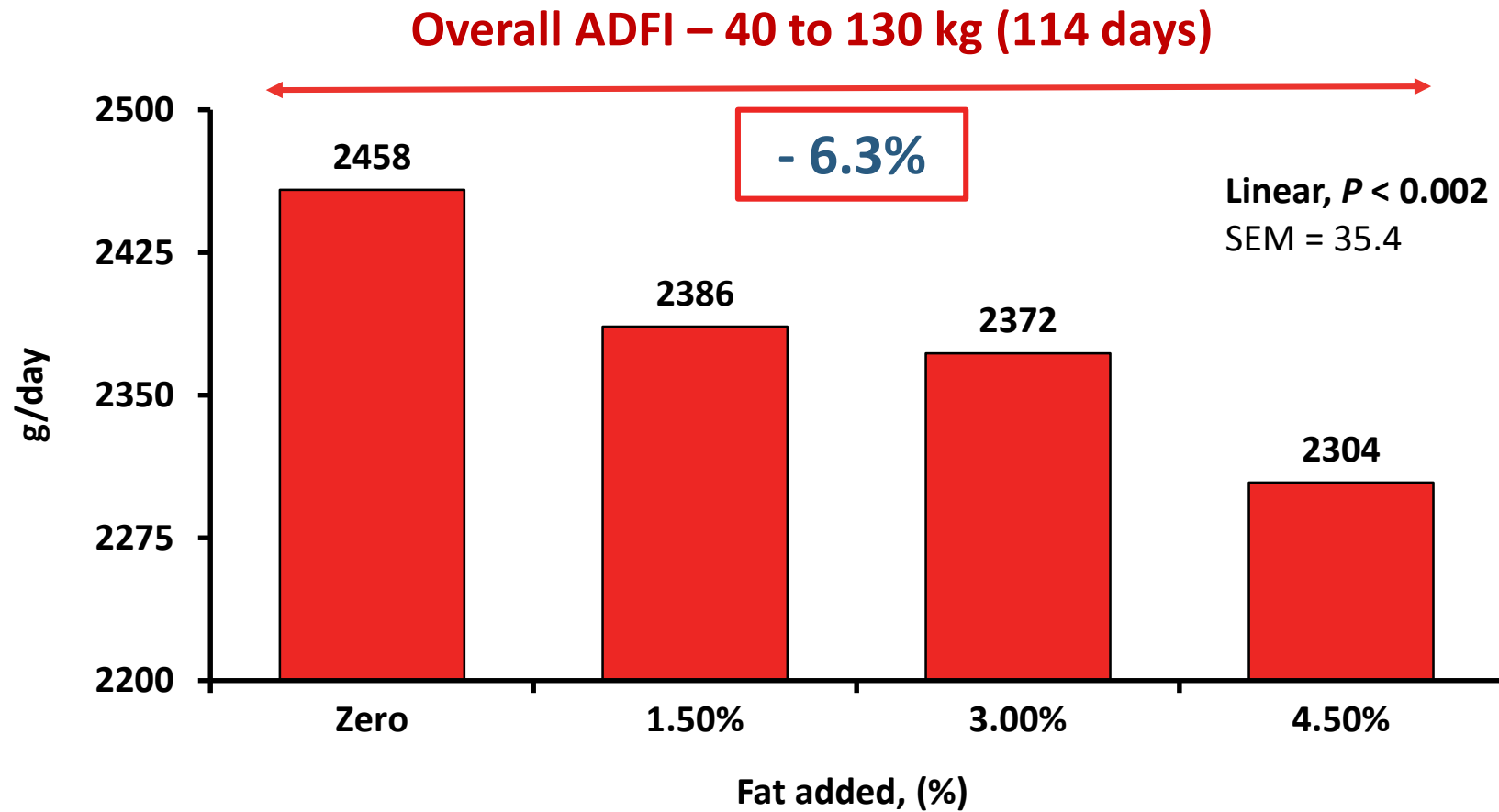
Body weight distribution of a population of pigs with an average initial weight of 23 kg



Nutritional factors:

Energy by fat/oil

Effects of added fat on ADFI of G-F pigs under commercial conditions



How can we reduce the risk of abnormal behavior?

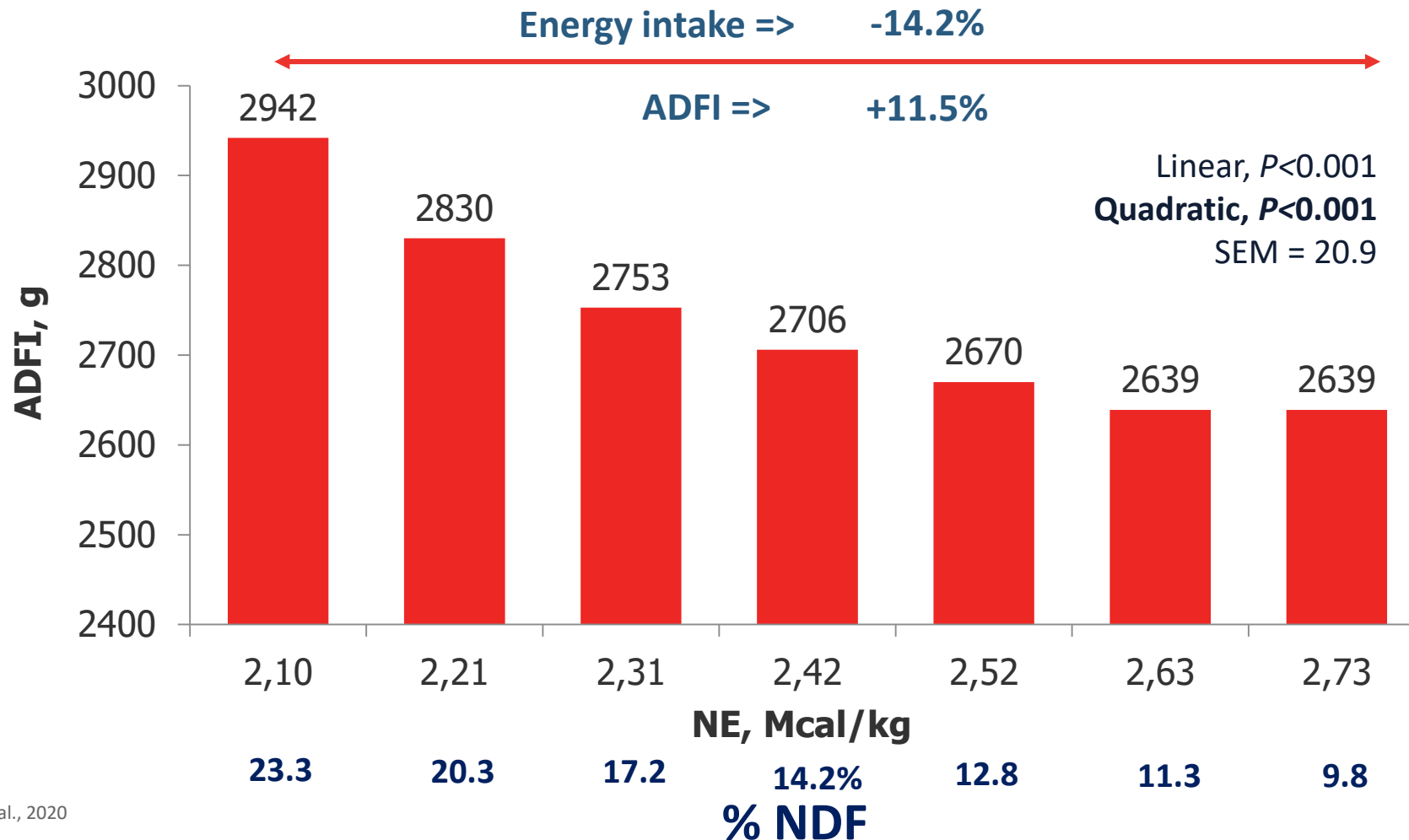
Energy by fat/oil and AA adjustments

PIC	Lysine requirement for PIC pigs			
	Corn + SBM without Fat			
	Phase 1	Phase 2	Phase 3	Phase 4
Energy level, NRC ME kcal/kg	3250	3250	3250	3250
Weight In, kg	22	40	55	95
Weight Out, kg	40	55	95	115
SID Lys:Cal ME Gilts	3.68	3.17	2.57	2.27
SID Lys % (ME equation) Gilts	1.20	1.03	0.83	0.74
% of PIC 2016	100%	100%	100%	100%

Nutritional factors:

Energy and fiber

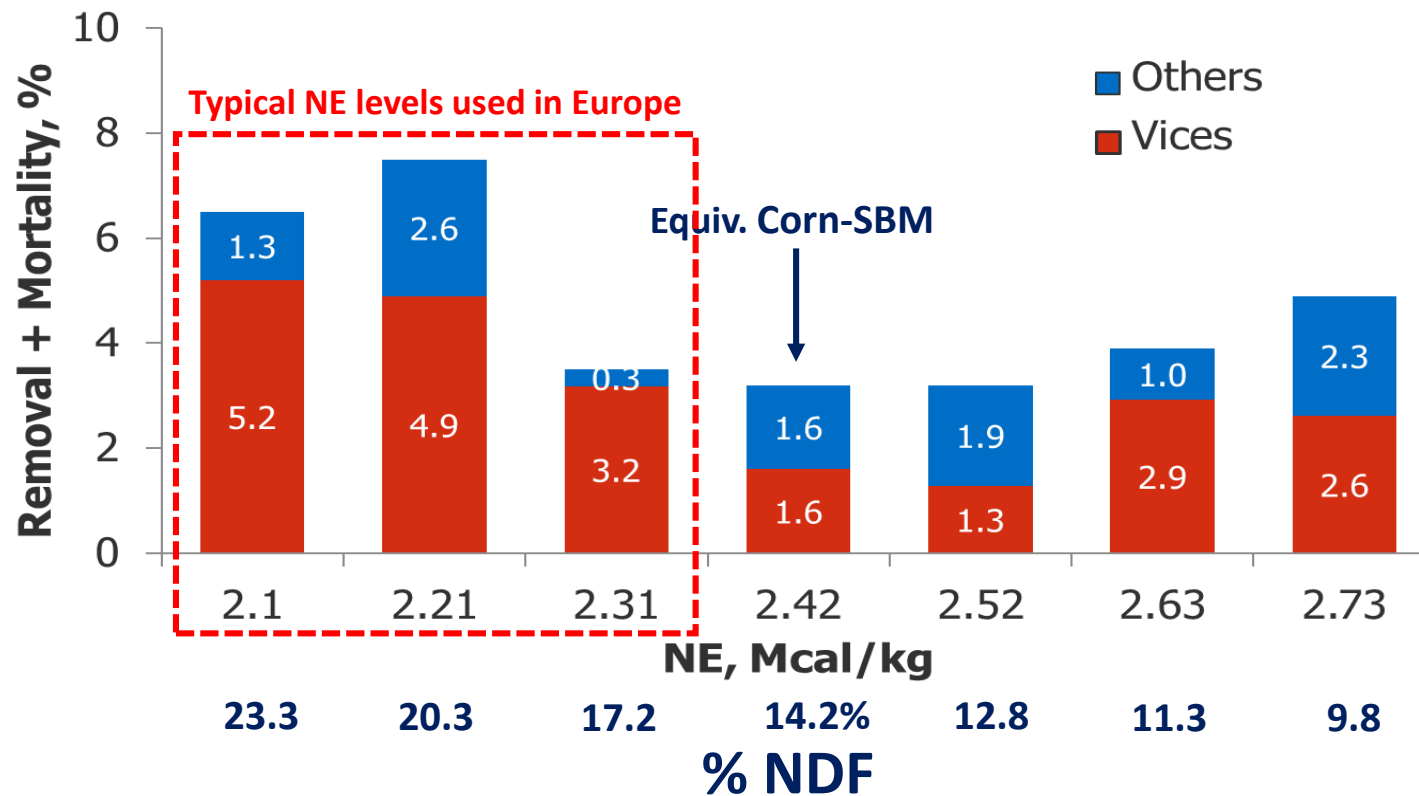
Effects of dietary NE and NDF levels on ADFI of 30 to 135 kg pigs



Nutritional factors: Energy and fiber

Effects of dietary NE and NDF levels on behavior of 30 to 135 kg pigs

Vices were numerically more prevalent in low energy diets



How can we reduce the risk of abnormal behavior?

Special attention on liquid feeding

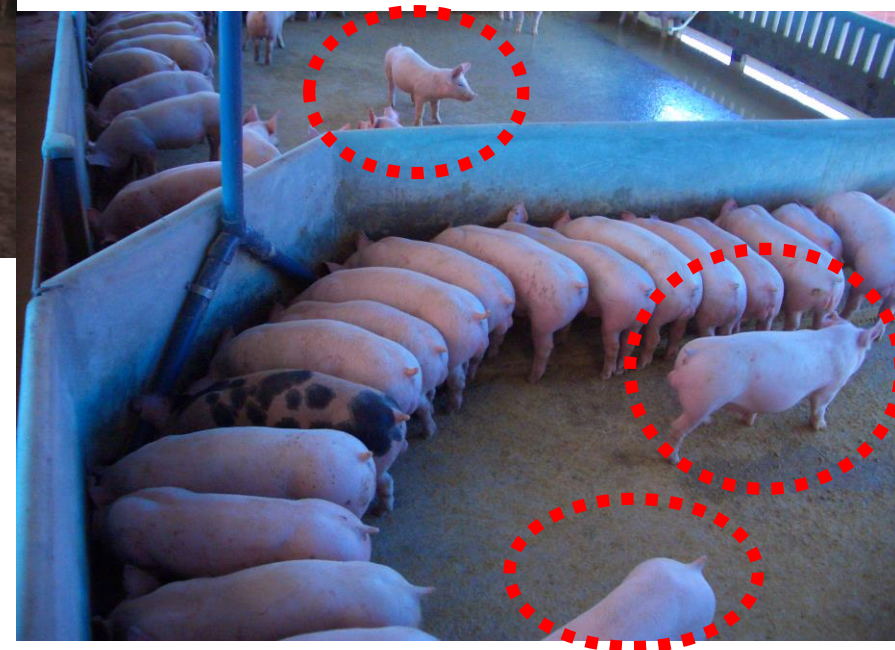
- ✓ Restricted feeding;
 - ✓ Times per day;
 - ✓ Feed interruptions;
- ✓ Homogenous distribution;
 - ✓ Proportion Water:feed
 - ✓ Age or weight
 - ✓ Dry matter intake;
- ✓ Using liquid by product;
 - ✓ Feed imbalance;
- ✓ Contaminants;
 - ✓ Keep maintenance;
- ✓ First pen vs. last one.



How can we reduce the risk of abnormal behavior?

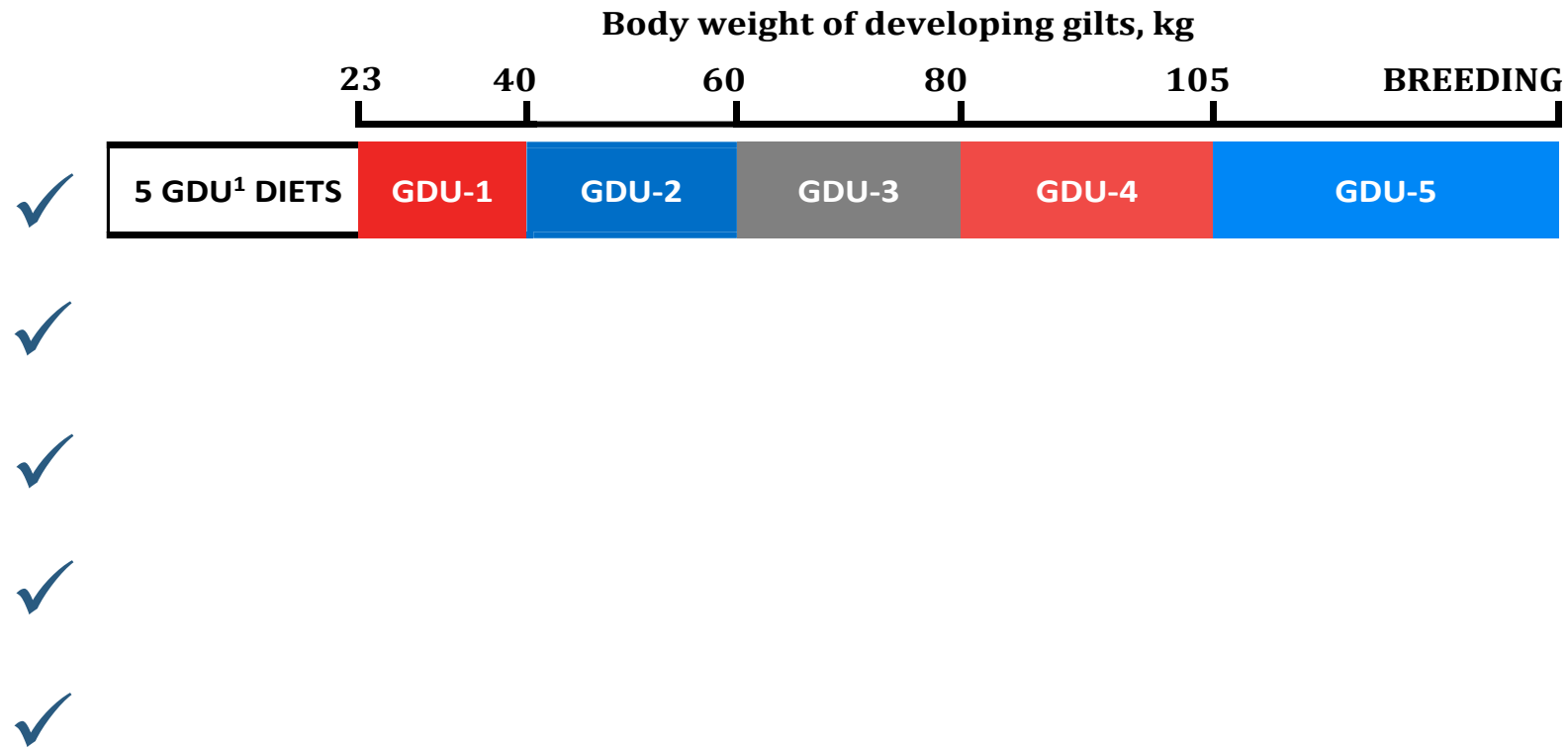


Special attention on liquid feeding



How can we reduce the risk of abnormal behavior?

Replacement gilts: How many diets to build a reasonable phase feeding



¹GDU: gilt development unit.

Take Home Message: Winning the Race

▶ Never Stop Improving
Nutrition Technical Services



A woman with dark hair tied back, wearing a white lab coat with a red PIC logo on the chest, is sitting on a wooden slatted floor in a pigpen. She is surrounded by several white piglets. The background shows a concrete wall and a window. The overall scene is brightly lit.

Nutritional factors associated with abnormal behaviors in pigs

Thank you!

PIC Global Nutrition Team

For more details on nutritional factors, please see factsheet: [Nutritional factors associated with abnormal behaviors in pigs.](#)