Never
Stop
Improving

PIC NUTRITION TOOLS

PIC GLOBAL NUTRITION TEAM

METRIC VERSION

Revised for PIC Philippines – June 23 and 24, 2021

PIC Philippines Technical Services Team

PIC®

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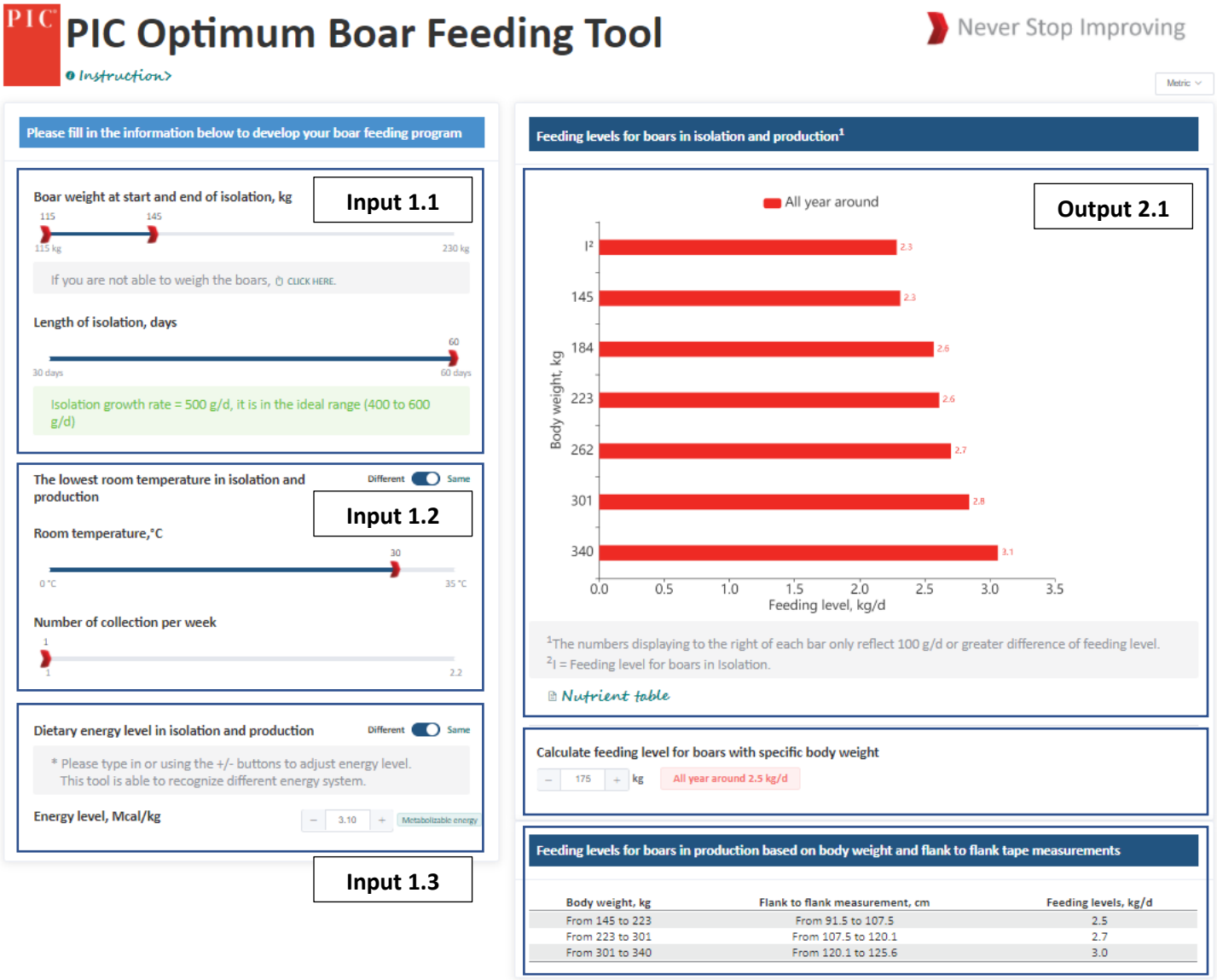
PIC Optimum Boar Feeding Tool

- Overall layout of the PIC Optimum Boar Feeding Tool is shown below. Each dotted box will be introduced separately.

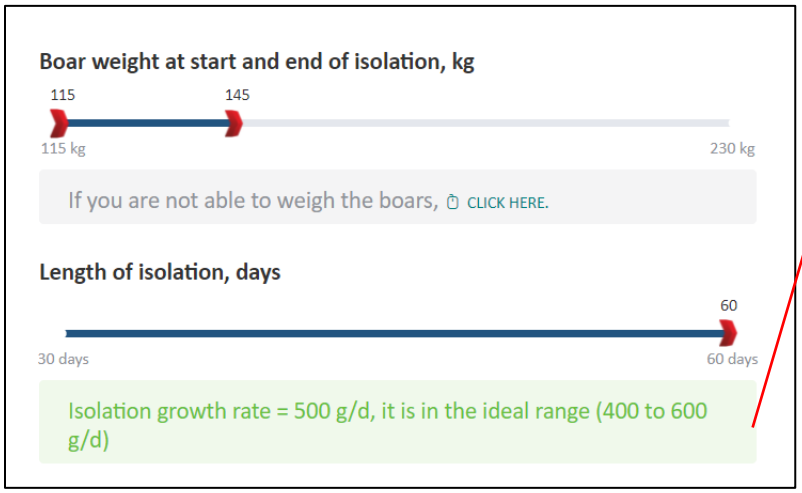


1. INPUTS

1.1. Using the slider to select the start and end body weight, as well as the length of isolation.

We will use the following inputs in the exercise:

- Start weight: 115 kg
- End weight: 145 kg
- Length of isolation: 60 days



The tool automatically calculates the isolation growth rate:

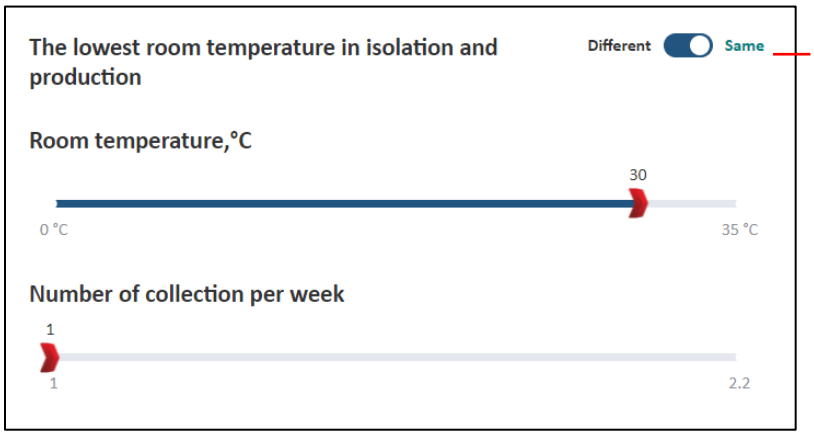
- Ideal range = 400 to 600 g/d
- Acceptable range = 200 to 900 g/d

The tool only works within the acceptable range. It will stop working and show a warning message at output if the isolation growth rate is out of acceptable range.

1.2. Using the slider to select the lowest room temperature of the facility and select how many collections per boar per week.

We will use the following inputs in the exercise:

- The isolation and production barns have the same (lowest) room temperature of 30 °C
- Boars are collected <u>once per week</u>

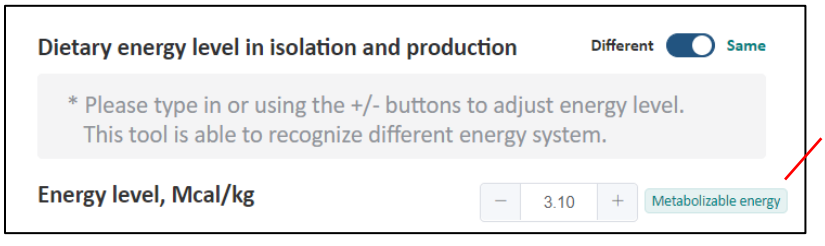


Use the toggle to select the situation that fits your stud

1.3. Input the energy level of your boar feed.

We will use the following inputs in the exercise:

- Boars in isolation and production are fed similar diets with 3.10 Mcal ME/kg



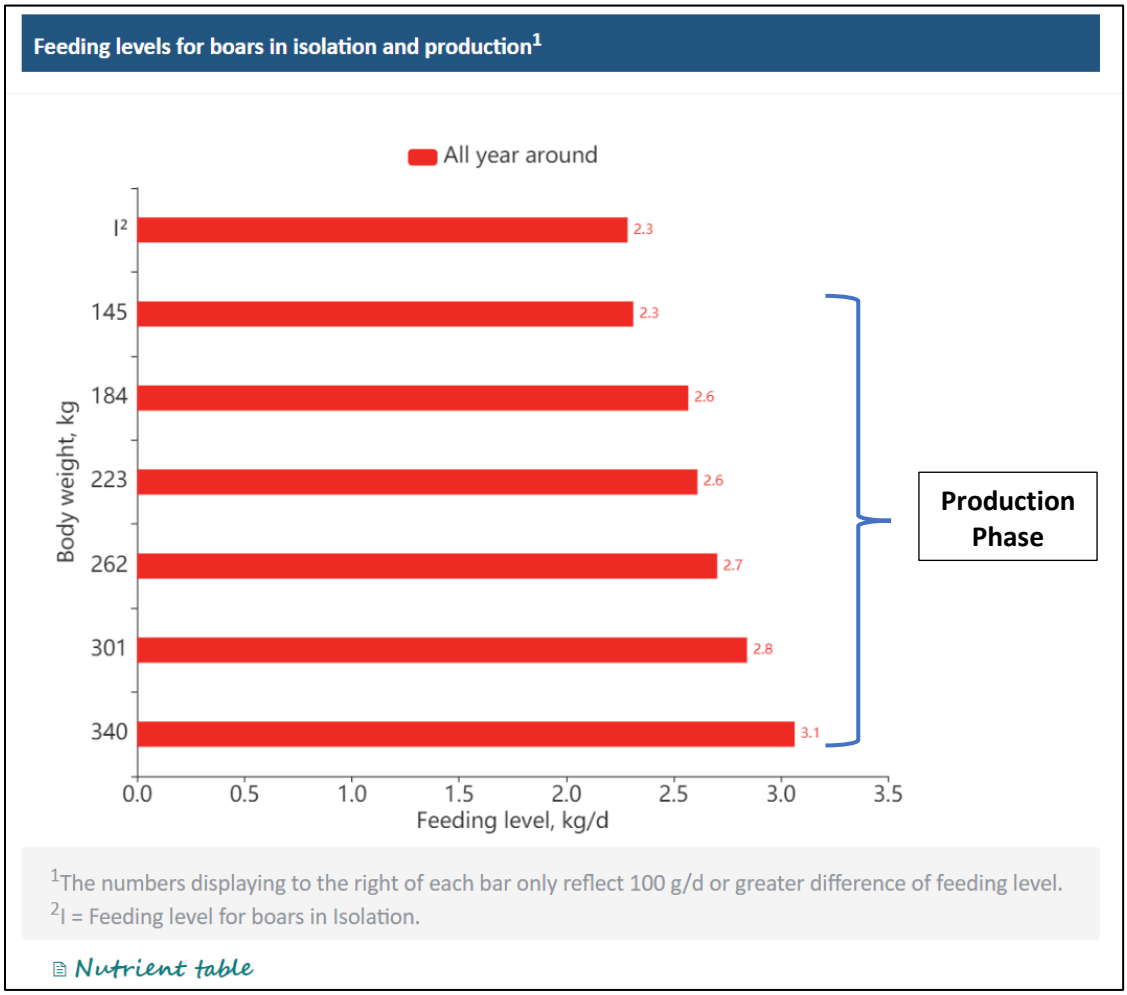
The tool automatically recognizes energy system ME or NE).

If input NE is lower than 2.0 Mcal/kg, or input ME is greater than 3.7 Mcal/kg, the tool will stop working and a warning message will be shown at output

2. OUTPUTS

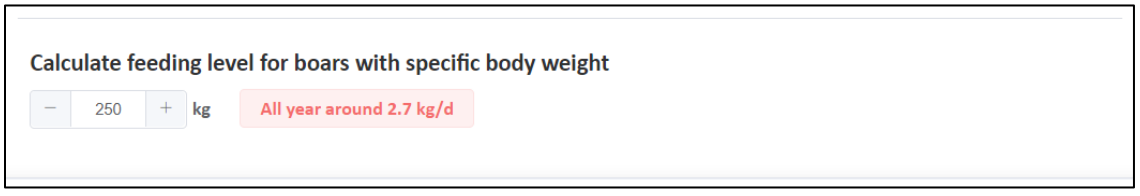
2.1. Feeding levels for boars in isolation and production.

- **The cold season feeding level is only used when the room temperature is lower than 17°C.**
- In some cases, the length of the bars is different, but the data showed identical feeding level. It is because of rounding, and the numbers only reflect difference of 100 g/d or greater.



2.2. Calculate feeding level for production boars with specific body weight.

- This estimation is only applicable for boars in production.
- The range of the input weight is 115 to 340 kg.



2.3. Simplified feeding program for boars in production.

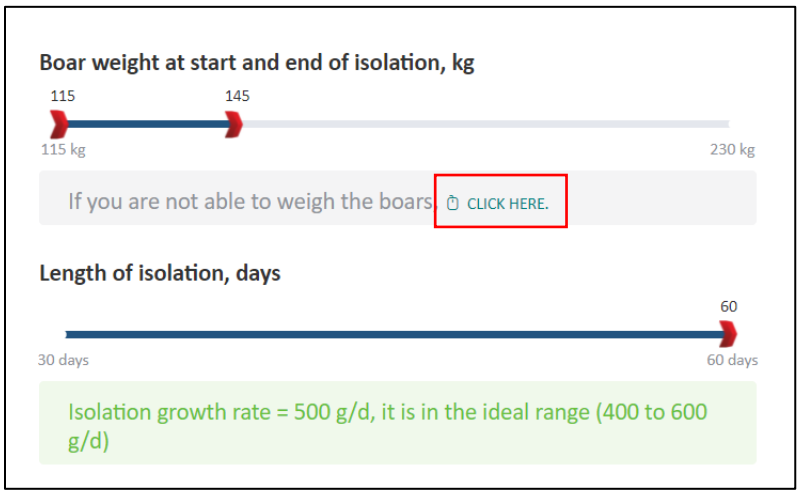
- This table is only applicable for boars in production.
- The table simplifies the feeding program by combining boars receiving similar feed allowance.
- The feeding levels that are shown in the table represent the average estimated feeding

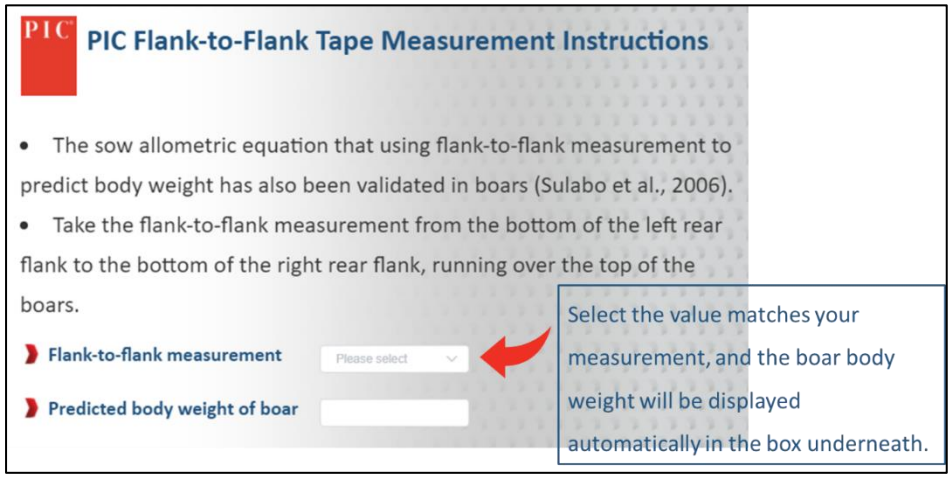
Feeding levels for boars in production based on body weight and flank to flank tape measurements

Body weight, kg	Flank to flank measurement, cm	Feeding levels, kg/d
From 145 to 223	From 91.5 to 107.5	2.5
From 223 to 301	From 107.5 to 120.1	2.7
From 301 to 340	From 120.1 to 125.6	3.0

2.4. Flank-to-flank tape measurement converter.

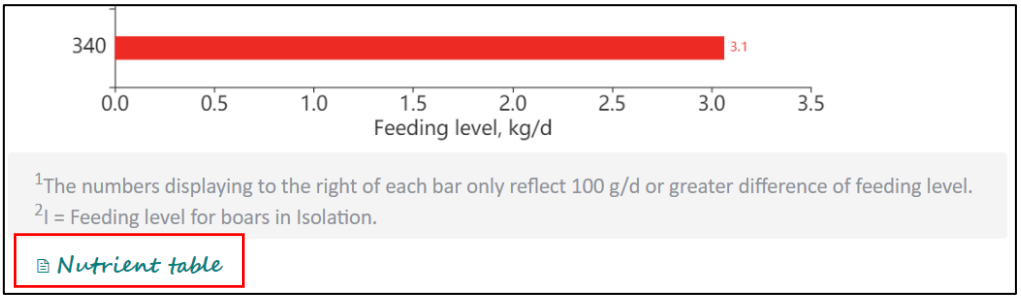
This converter helps users to convert flank-to-flank tape measurement (cm) into boar body weight (kg). The converter is located right under the isolation boar weight input slider.





2.5. Nutrient table.

The nutrient table entrance is located right under the feeding program bar graph.



The recommended nutrient levels in the nutrient table are based on the PIC Nutrition and Feeding Guidelines and adjusted according to the user's dietary energy level.

Nutrient Specification Table for Boars[a,b]

Download

Can be downloaded as Excel

ITEM	UNIT	ISOLATION AND PRODUCTION FEED
NRC NE	Mcal/kg	2.29
NRC ME	Mcal/kg	3.10
Neutral detergent fiber, min.	%	11
Linoleic acid	%	1.86
Standardized ileal digestible amino acids		
Lysine:Calorie NE	g/Mcal	2.64
Lysine:Calorie ME	g/Mcal	1.95
Lysine	%	0.60
Methionine + Cysteine:Lysine	Ratio	70
Threonine:Lysine	Ratio	74
Tryptophan:Lysine	Ratio	20
Valine:Lysine	Ratio	67
Isoleucine:Lysine	Ratio	58
Leucine:Lysine	Ratio	65
Histidine:Lysine	Ratio	30

PIC Nutrient Recommendations for Developing Gilts

- The overall layout of the PIC Nutrient Recommendations for Developing Gilts is shown below.

PIC Nutrient Recommendations for Developing Gilts v1.0

Never Stop Improving Your Success.

ITEM	UNIT			**	!
Weight In	**kg**	23	60	90	23
Weight Out	**kg**	60	90	135	135
NRC Metabolizable Energy (ME)	**kcal/kg**	3130	3130	3000	3130
Standardized Ileal Digestible amino acids					
Lysine:Calorie ME	g/Mcal	3.14	2.57	1.86	3.19
Lysine	%	0.98	0.80	0.56	1.00
Methionine + cysteine:Lysine	Ratio	58	58	58	58
Threonine:Lysine	Ratio	65	65	66	66
Tryptophan:Lysine	Ratio	18	18	18	18
Valine:Lysine	Ratio	68	68	68	68
Isoleucine:Lysine	Ratio	56	56	56	56
Leucine:Lysine	Ratio	101	101	102	102
Histidine:Lysine	Ratio	34	34	34	34
Phenylalanine + tyrosine:Lysine	Ratio	94	95	96	96
L-Lysine-HCl, max.	%	0.40	0.32	0.27	0.35
Minerals					
Sodium	%	0.25	0.25	0.25	0.25
Chloride	%	0.25	0.25	0.25	0.25
STTD P:Calorie ME	g/Mcal	1.22	1.04	0.87	1.17
STTD P	%	0.38	0.32	0.26	0.37
Av. P:Calorie ME	g/Mcal	1.05	0.89	0.75	1.00
Av. P	%	0.33	0.28	0.22	0.31
Analyzed Ca:analyzed P, range	Ratio	1.25-1.50	1.25-1.50	1.25-1.50	1.25-1.50
Added trace minerals					
Zinc	ppm	125	125	125	125
Iron	ppm	100	100	100	100
Manganese	ppm	50	50	50	50
Copper	ppm	15	15	15	15
Iodine	ppm	0.35	0.35	0.35	0.35
Selenium	ppm	0.30	0.30	0.30	0.30
Added vitamins	per kg diet				
Vitamin A	IU/kg	9920	9920	9920	9920
Vitamin D	IU/kg	1985	1985	1985	1985
Vitamin E	IU/kg	66	66	66	66
Vitamin K	mg/kg	4.4	4.4	4.4	4.4
Choline	mg/kg	660	660	660	660
Niacin	mg/kg	44	44	44	44
Riboflavin	mg/kg	10.0	10.0	10.0	10.0
Pantothenic acid	mg/kg	33	33	33	33
Vitamin B12	mcg/kg	37	37	37	37
Folic Acid	mcg/kg	1325	1325	1325	1325
Biotin	mcg/kg	220	220	220	220
Thiamine	mg/kg	2.2	2.2	2.2	2.2
Pyridoxine	mg/kg	2.3	3.3	3.3	3.3

INPUTS

OUTPUT 1

OUTPUT 2

OUTPUT 3

! Because the weight range is so wide, PIC biological recommendation is set as 85% of the recommendation at the beginning of the phase

** if desired weight at breeding is not met, PIC recommends using 97% of SID Lysine requirement for commercial gilts above 90 kg

Inputs:

1. Open the appropriate tool according to the energy system being used. For this exercise, we will utilize the ME system (metabolizable energy).
2. Enter the desired weight breaks and energy levels according to the number of phases being utilized.
    a. For this exercise, we will use three different dietary phases as follow:
        i. Phase 1: 23 to 60 kg
        ii. Phase 2: 60 to 90 kg
        iii. Phase 3: 90 kg to breeding (~135 kg)
    b. The energy levels in each phase are as follow:
        i. Phase 1: 3,130 kcal ME/kg
        ii. Phase 2: 3,130 kcal ME/kg
        iii. Phase 3: 3,000 kcal ME/kg

ITEM	UNIT			**
Weight In	kg	23	60	90
Weight Out	kg	60	90	135
NRC Metabolizable Energy (ME)	kcal/kg	3130	3130	3000

Outputs:

1st Part:

Standardized Ileal Digestible amino acids				
Lysine:Calorie ME	g/Mcal	3.14	2.57	1.86
Lysine	%	0.98	0.80	0.56
Methionine + cysteine:Lysine	Ratio	58	58	58
Threonine:Lysine	Ratio	65	65	66
Tryptophan:Lysine	Ratio	18	18	18
Valine:Lysine	Ratio	68	68	68
Isoleucine:Lysine	Ratio	56	56	56
Leucine:Lysine	Ratio	101	101	102
Histidine:Lysine	Ratio	34	34	34
Phenylalanine + tyrosine:Lysine	Ratio	94	95	96
L-Lysine-HCl, max.	%	0.40	0.32	0.27

- The first part of the output will display the SID Lys (in grams:Mcal ME and in % basis) and the respective amino acid to lysine ratios recommendations for each phase.
- The SID Lys:ME ratios are estimated as 97% of the recommendations for a commercial gilt.

- However, you will notice the two red asterisks (**) that showed up above the weight break from phase 3. They indicate that if body weight in that phase is above 90 kg, our recommendation is to use a SID Lys to calorie ratio like that of a gestation diet. In a situation that the desired body weight target at first breeding is not being met, we would then recommend to the 97% of the SID Lys recommended to a commercial gilt.

2nd Part:

Minerals				
Sodium	%	0.25	0.25	0.25
Chloride	%	0.25	0.25	0.25
STTD P:Calorie ME	g/Mcal	1.22	1.04	0.87
STTD P	%	0.38	0.32	0.26
Av. P:Calorie ME	g/Mcal	1.05	0.89	0.75
Av. P	%	0.33	0.28	0.22
Analyzed Ca:analyzed P, range	Ratio	1.25-1.50	1.25-1.50	1.25-1.50

- The second part of the output will display the macro mineral recommendations for each phase.
- The STTD P to ME ratios is estimated as 108% of the recommendations for a commercial gilt to maximize bone mineralization.
- The recommendations for Available P are estimated as 86% of the STTD P recommendations in a corn-soybean meal-diet using the digestibility coefficients and P bioavailability from NRC (1998 and 2012).
- The calcium recommendations are provided as a range of analyzed Ca to analyzed P ratios.

3rd Part:

Added trace minerals				
Zinc	ppm	125	125	125
Iron	ppm	100	100	100
Manganese	ppm	50	50	50
Copper	ppm	15	15	15
Iodine	ppm	0.35	0.35	0.35
Selenium	ppm	0.30	0.30	0.30
Added vitamins	per kg diet			
Vitamin A	IU/kg	9920	9920	9920
Vitamin D	IU/kg	1985	1985	1985
Vitamin E	IU/kg	66	66	66
Vitamin K	mg/kg	4.4	4.4	4.4
Choline	mg/kg	660	660	660
Niacin	mg/kg	44	44	44
Riboflavin	mg/kg	10.0	10.0	10.0
Pantothenic acid	mg/kg	33	33	33
Vitamin B12	mcg/kg	37	37	37
Folic Acid	mcg/kg	1325	1325	1325
Biotin	mcg/kg	220	220	220
Thiamine	mg/kg	2.2	2.2	2.2
Pyridoxine	mg/kg	2.3	3.3	3.3

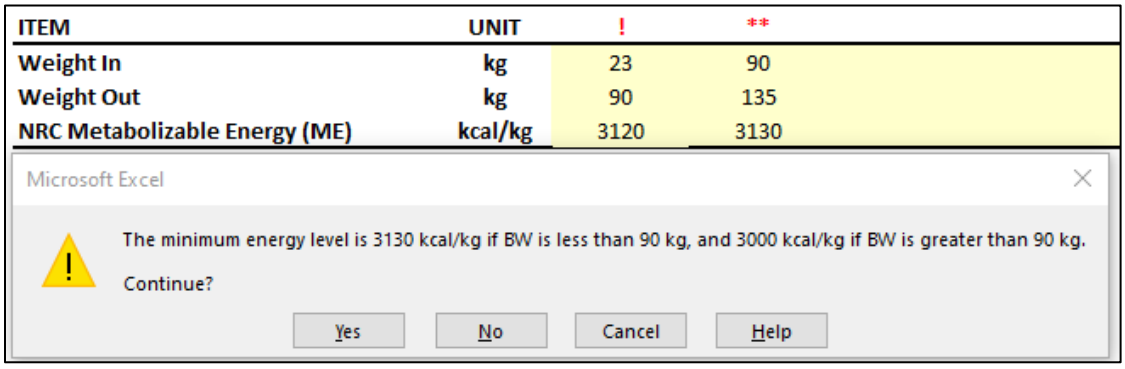
- The third part of the output will display the added trace mineral recommendations in ppm and added vitamin recommendations in units/kg for each phase.
- These values represent micronutrient supplementation without giving credit for ingredient content.
- The added vitamin and trace mineral recommendations are identical to sow levels. However, if the sow-VTM cannot be used before 60 kg of BW, the VTM levels recommended for commercial pigs can be used.

Notes:

- After approximately 90 kg of body weight, PIC recommendation is to feed a gestation diet to avoid having to manufacture another specialized gilt development diet.
- If the weight range of a phase is too wide, a red exclamation point will show up (!) above the weight break of that specific phase.

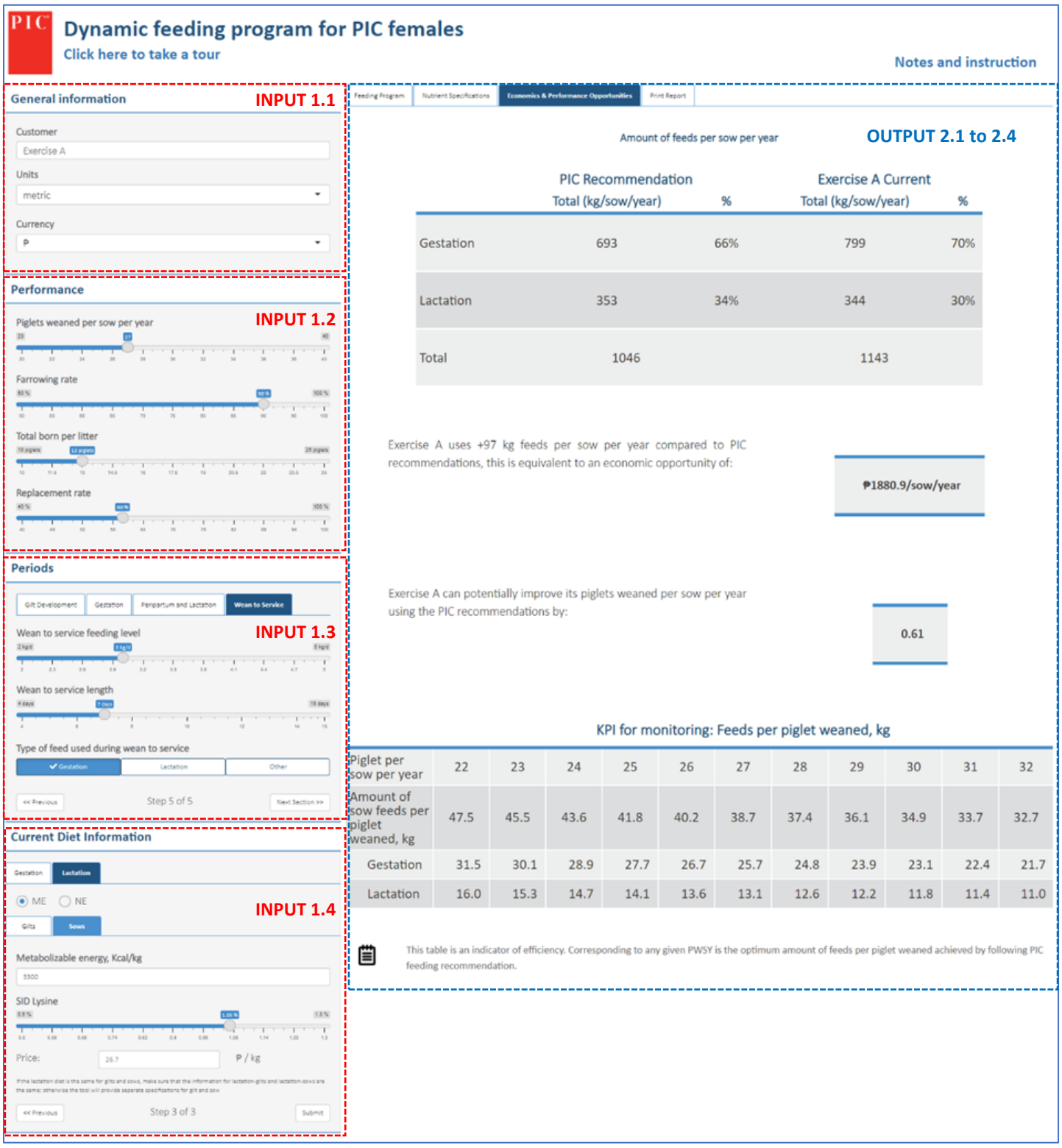
ITEM	UNIT	!	**
Weight In	kg	23	90
Weight Out	kg	90	135
NRC Metabolizable Energy (ME)	kcal/kg	3130	3130

- This exclamation point will inform the user that because the weight range is so wide, the PIC recommendations for lysine and phosphorus are set as 85% of the biological recommendations at the beginning of that phase. This is to reduce the likelihood of abnormal behavior development.
- If the energy concentration of the diet is below 3130 kcal ME/kg for BW less than 90 kg or if the energy concentration of the diet is below 3000 kcal ME/kg for BW greater than 90 kg, an alert message will be displayed. These are recommended minimum energy levels to reduce the likelihood of abnormal behavior development.



Dynamic Feeding Program for PIC Females

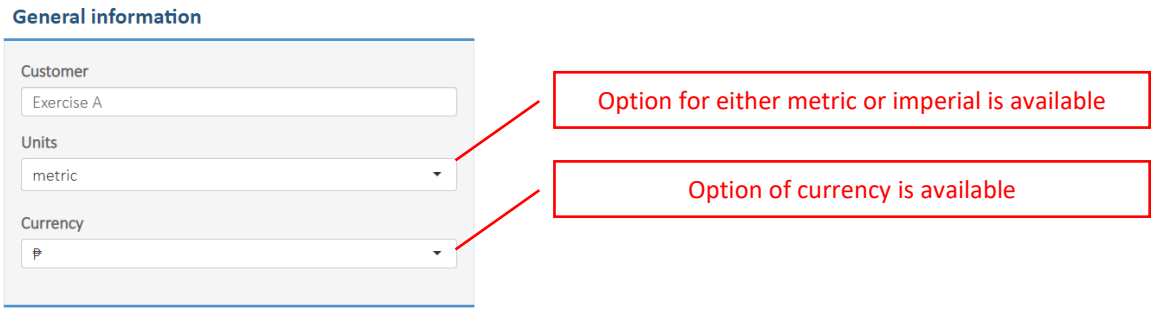
- Overall layout of the **Dynamic Feeding Program for PIC Females** is shown below. Each dotted box will be introduced separately.



INPUTS

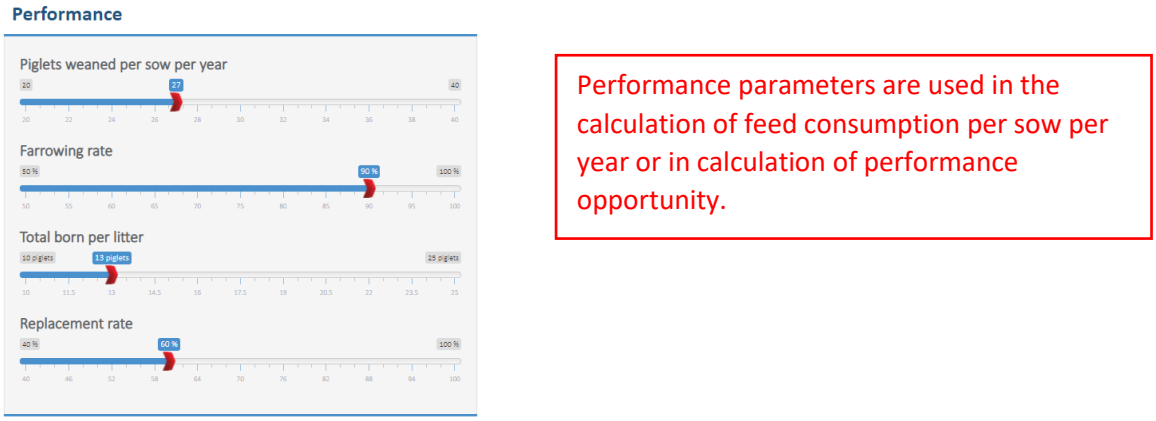
1.1. **General information.** Indicate the name of the customer (or farm name) and choose the unit of measurement and currency from the drop down. We will use the following inputs in this exercise:

- Customer: Exercise A
- Units: Metric
- Currency: P



1.2. **Performance.** Indicate the current performance [i.e., pigs weaned per sow per year (PWSY), farrowing rate, total born per litter and replacement rate using the slider. We will use the following inputs in this exercise:

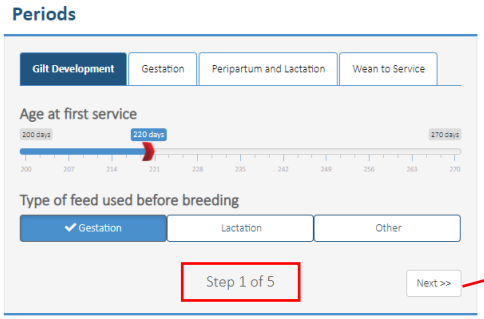
- PWSY: 27
- Farrowing rate: 90%
- Total born per litter: 13
- Replacement rate: 60%



1.3. **Periods.** This is further categorized to: gilt development, gestation (gilts and sows), peripartum and lactation and wean to service. Hit the Next >> button to proceed with the periods. Once the 5 steps are completed, the Next Section >> button will appear

1.3.1. Gilt development (step 1 of 5). Indicate the age at first service using a slider and choose the type of feed used before breeding. We will use the following inputs in this exercise:

- Age at first service: 220
- Type of feeds used before breeding: Gestation



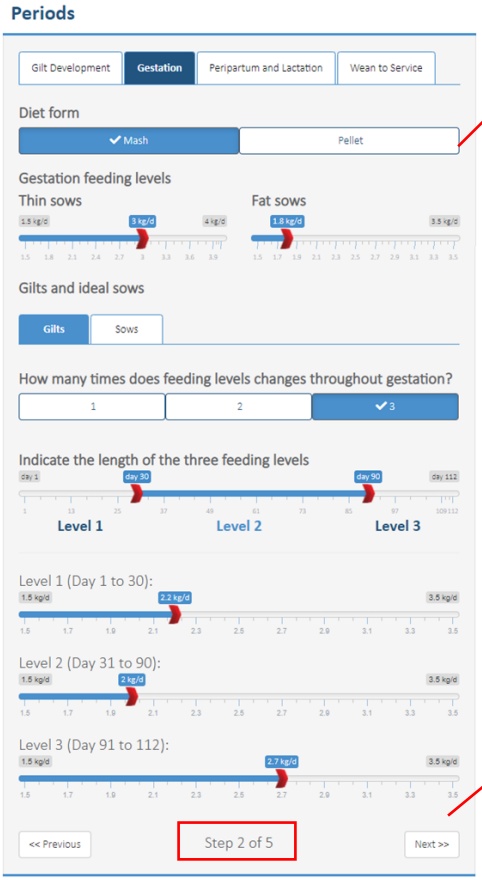
For feed type other than gestation or lactation, select "others". When "others" is selected, the program will assume gestation feed for the calculation of current sow feeds per sow per year

Click **Next >>** to proceed to next period

1.3.2. Gestation (steps 2 and 3 of 5). Choose the diet form (mash or pellet) and indicate the feeding levels for thin sow, fat sows, ideal sows, and gilts using the slider. For gilts and ideal sows, indicate the number of times that feeding levels changes throughout gestation and the corresponding length. We will use the following inputs in this exercise:

- Diet form: Mash
- Feeding levels (thin sows): 3.0 kg
- Feeding levels (fat sows): 1.8 kg
- How many times does feeding levels changes throughout gestation: 3 (both gilts and sows)
- Indicate the length of the x (in this case 3) feeding levels and the corresponding levels:

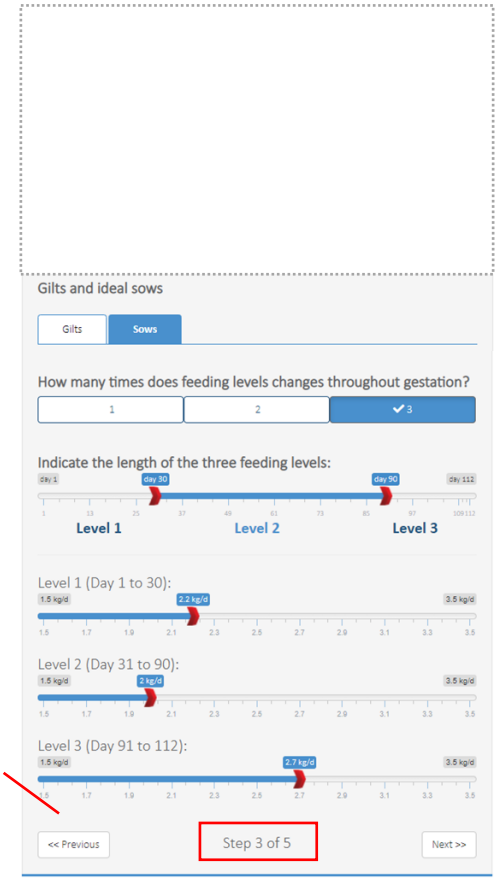
Length (of each period)	Gilts	Ideal Sows
D 1 to 30	2.2 kg	2.2 kg
D 91 to transfer (112)	2.7 kg	2.7 kg
D 31 to 90	2.0 kg	2.0 kg



When pellet is selected, the tool will assume 3% improvement in energy

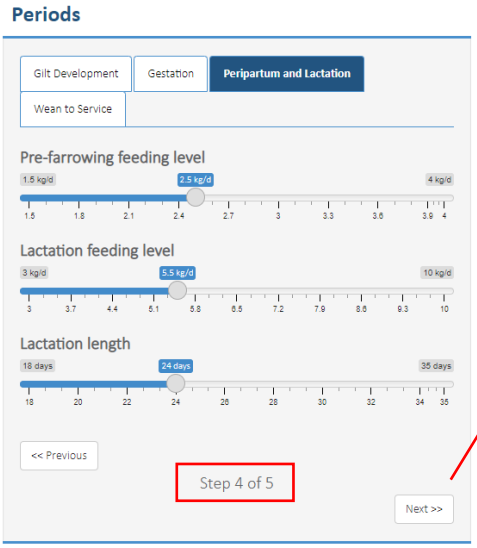
In our example feeding levels changed thrice throughout gestation (1-30, 31-90 and 91-transfer). In the example, it follows a high-low-high scheme

Click **Next >>** to proceed to next periods. Step 2 of 5 is for gilts, whereas step 3 of 5 is for ideal sows



1.3.3. Peripartum and lactation (steps 4 of 5). Indicate the pre-farrowing and lactation feeding levels and the lactation length using the slider. We will use the following inputs in this exercise:

- Pre-farrowing feeding level: 2.5 kg
- Lactation feeding level: 5.5 kg
- Lactation length: 24 days



The user-defined lactation feeding level and length (along with the models) will be used as the basis for the change in lactation feed intake when PIC feeding recommendation is followed

Click **Next >>** to proceed to next period

1.3.4. Wean to service (steps 5 of 5). Indicate the wean to service feeding level and wean to service length using the slider and choose the type of feed used during wean to service. We will use the following inputs in this exercise:

- Wean to service feeding level: 3.0 kg
- Wean to service length: 7 days
- Type of feed used during wean to service: Gestation

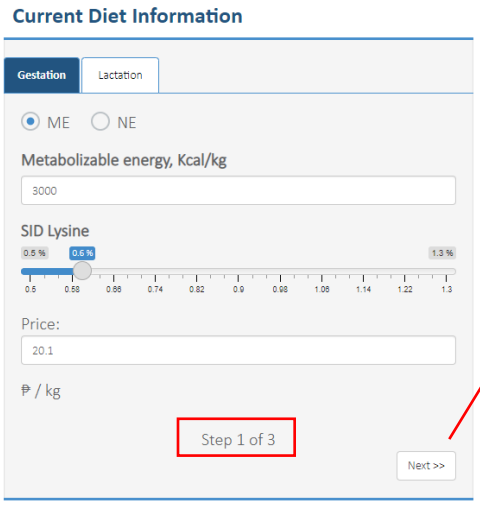
For feed type other than gestation or lactation, select “others”. When “others” is selected, the program will assume gestation feed for the calculation of current sow feeds per sow per year

Click **Next section >>** to proceed to next section (i.e., Current diet information)

1.4. **Current diet information.** This is further categorized to: gestation and lactation (gilts and sows). For each feed type, user will define the diet energy, SID Lys, and price. For energy, though the calculation is based on metabolizable energy (ME) there is an option of using either ME or net energy (NE). If NE values are used, they are converted to ME using the factor 0.75. Hit the Next >> button to proceed with the current diet information. Once the 3 steps are completed, the Submit button will appear.

1.4.1. Gestation (step 1 of 3). Indicate the energy system (ME or NE) and the corresponding dietary level, the SID Lys level, and the price (per kg). We will use the following inputs in this exercise:

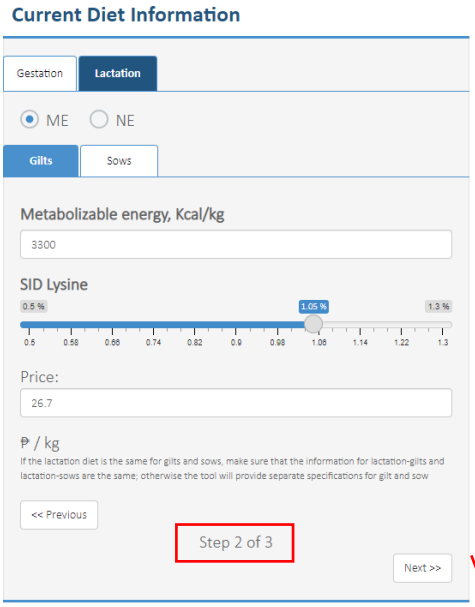
- ME: 3000 kcal/kg
- SID Lys: 0.60%
- Price: 20.1 P/kg



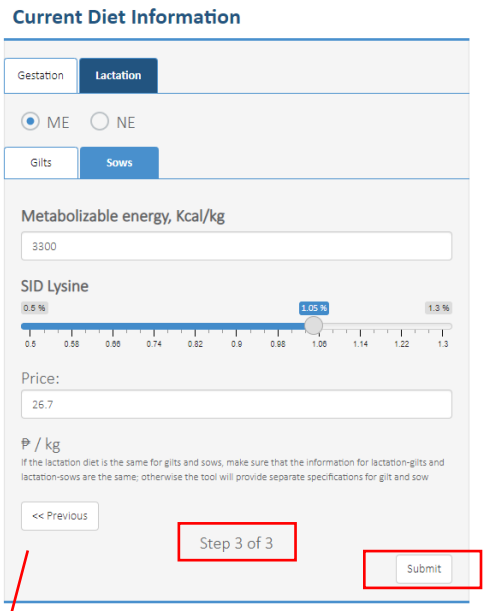
Click **Next >>** to proceed to next diet

1.4.2. Lactation (step 2 and 3 of 3). Indicate the energy system (ME or NE) and the corresponding dietary level, the SID Lys level, and the price (per kg). The tool allows for a separate lactation diets for 1st lactation (gilts) and 2nd+ lactation (sows). If the lactation diet is the same for gilts and sows, make sure that the information in steps 2 and 3 of 3 are identical; otherwise, the tool will provide separate specifications for gilts and sows. We will use the following inputs in this exercise:

- ME: 3300 kcal/kg
- SID Lys: 1.05%
- Price: 26.7 P/kg



If the lactation diet is the same for gilts and sows, make sure that the information in steps 2 and 3 of 3 are identical; otherwise, the tool will provide separate specifications for gilts and sows.

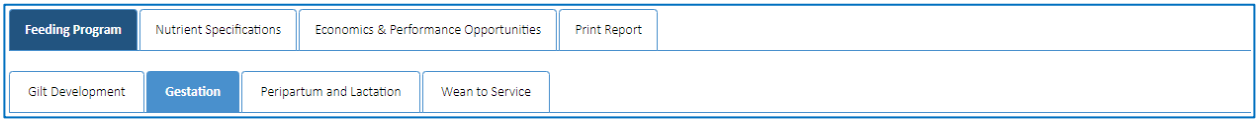


Click **Next >>** to proceed to next diet. Step 2 of 3 is lactation (gilts), whereas step 3 of 3 is lactation (sows)

When the 3 steps are completed, the "Submit" button will appear

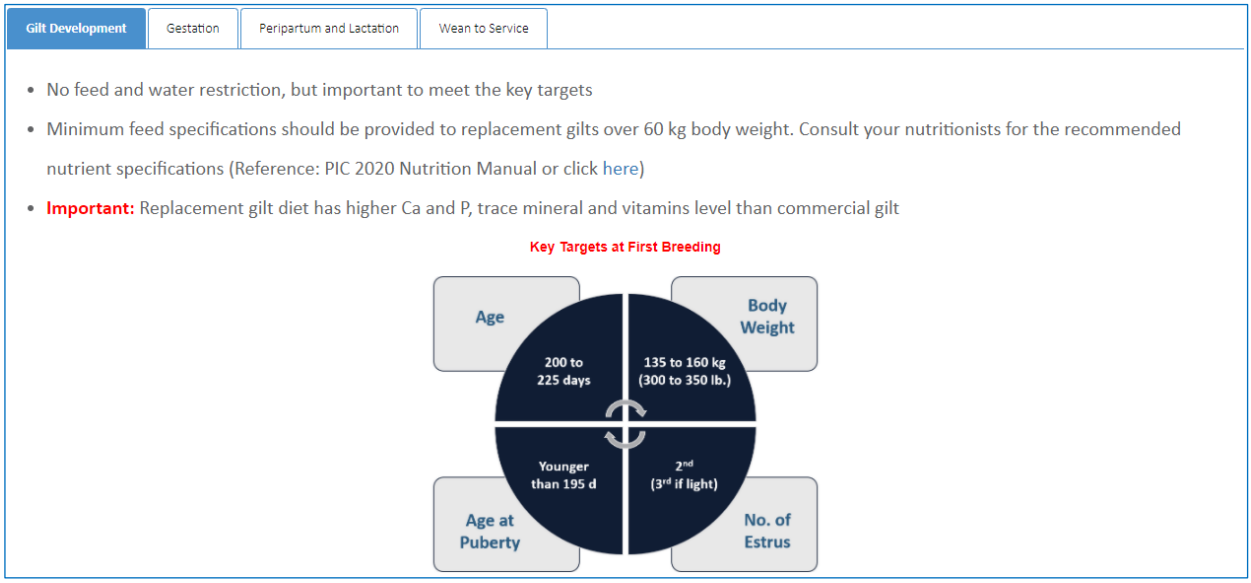
OUTPUTS

Once the inputs are submitted, the user will be directed to the right panel that contains the outputs. Below is the overall layout of the outputs (categories and sub-categories).



2.1. **Feeding program.** This includes the recommended feeding program during gilt development, gestation, peripartum and lactation and wean to service.

2.1.1. **Gilt development.** The key targets at first breeding are summarized, along with some notes on feeding. A link is available to access the Excel based Developing Gilt Tool (discussed separately during the symposium) which can provide dynamic nutrient recommendations for developing gilts.

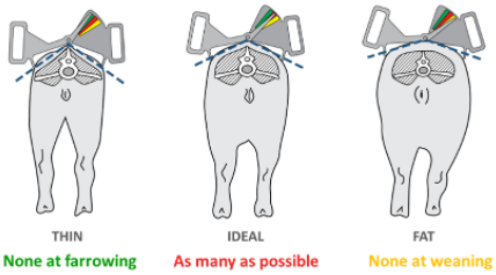


2.1.2. **Gestation.** The gestation feeding guide is provided in table categorized based on body condition (i.e., thin sows, fat sows, ideal sows and gilts) and calculated from user-defined dietary energy of gestation diet. Side by side with the recommended feeding levels are the current levels for comparison. See results of the exercise below. Additionally, the importance of body condition management, assessed using sow caliper, is highlighted. A link is available to access the most updated technical material of sow body condition management.

Important notes on feeding gestating gilts, early gestation feeding, and group feeding can be seen in the notes.

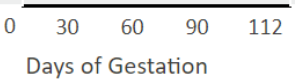
The gestation feeding guide is based on the user-defined energy level. Necessary corrections on other nutrients should be considered (see nutrient specification tab).

The goal of body condition management is to maintain sows in ideal condition and to avoid having any thin sows at farrowing or fat sows at weaning. PIC® recommends using the caliper to assess sow body condition. Click here to access the most updated technical material of sow body condition management.



Body condition of sows should be used as a guideline for gestation feeding.

		PIC Recommendation (kg/d)	Exercise A Current Feeding Level* (kg/d)
Thin sows	For thin sows to gain ~2 caliper units for every 30 d	2.7	3.0
Gilts and ideal sows	Base level for gilts and ideal sows to gain ~1.7 caliper units throughout gestation	2.0	2.2
Fat sows	For fat sows to reduce ~1 caliper unit throughout gestation	1.6	1.8



* The current feeding level for gilts and ideally conditioned sows presented in the table is the weighted average of the current program

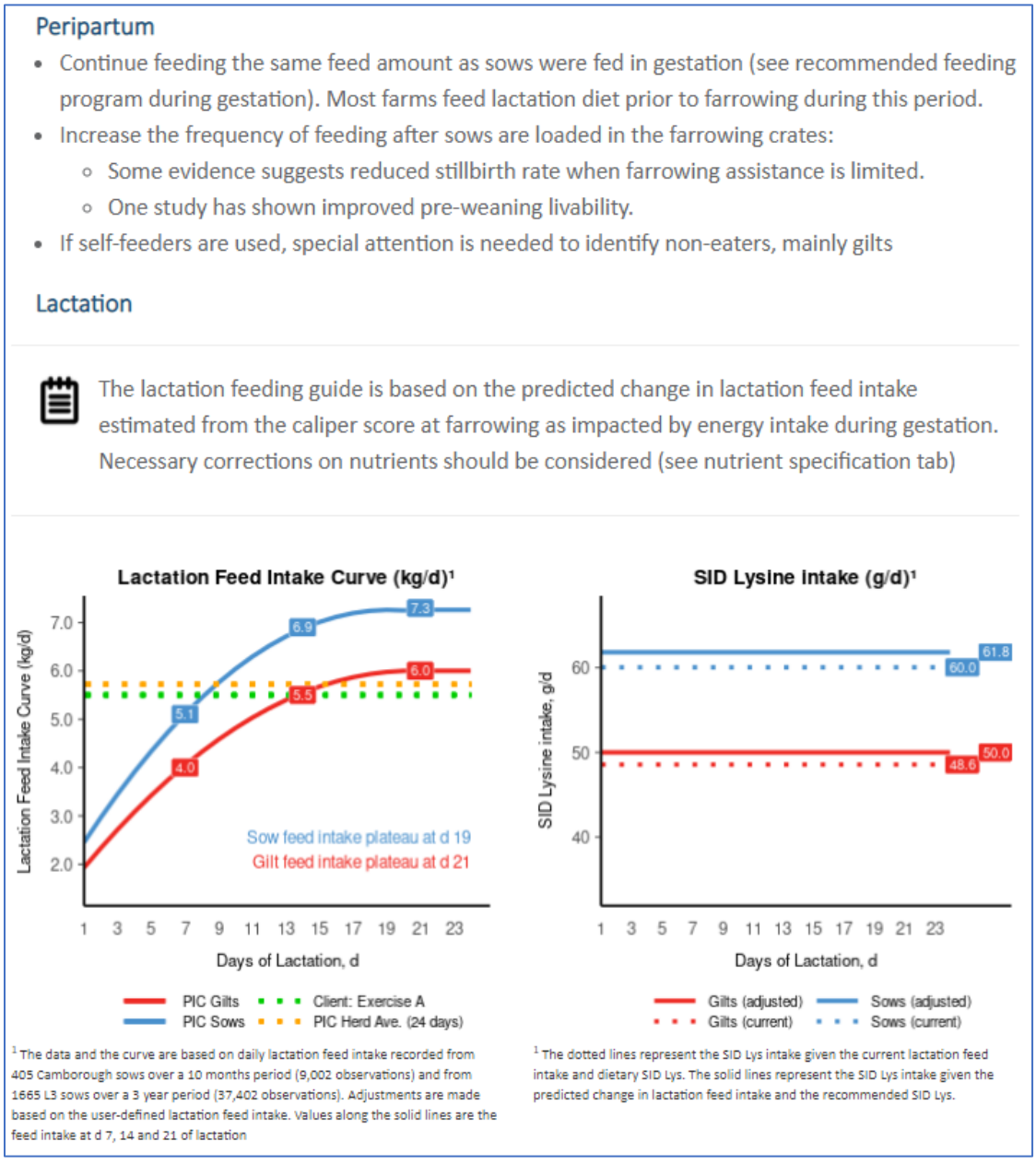
Notes:

- PIC recommends energy allowance of 4.4 Mcal NE/d or 5.9 Mcal ME/d for gilts throughout the entire gestation regardless of body condition
- PIC does not recommend feeding below maintenance during the first 30 days of gestation.
- For group gestating gilts/sows:
  - **ESF**. Check individual feed intake as gilts and P1 sows have difficulty of consuming adequate feed during the first few days after grouping.
  - **Floor feeding/station**. If aggressive behavior right after grouping is observed, provide up to 3.0kg (7.0lb) feed per day but for no longer than 5 days.

2.1.3. **Peripartum and lactation.** Nutrition and feeding recommendation during peripartum are provided in bullets.

For lactation, the predicted lactation feed intake (LFI) curves of gilts (represented by solid red line) and sows (represented by solid blue line) are shown. The herd average LFI (PIC and current), given the user defined lactation length, are represented by the yellow and green dotted lines, respectively. Beside the LFI curves is the graph of SID Lys intake. These are calculated from the predicted LFI and recommended dietary SID Lys.

Below the 2 graphs is a summary table of current LFI and SID Lys, and the predicted LFI and the recommended SID Lys. Since, we assume a common lactation diet for gilts and sows in this exercise, only one value of recommended SID Lys is provided (0.94, as herd); otherwise, a separate SID Lys will be provided for lactation (gilts) and lactation (sows).



	Gilts	Sows	Herd
Est. Exercise A ADFI (kg/d) for 24 d	4.63	5.72	5.50
Est. PIC ADFI (kg/d) for 24 d	4.81	5.95	5.72
Current SID Lys, %			1.05
Recommended SID Lys, %			1.04

The recommended SID Lys is based on the estimated PIC lactation feed intake achieved from following the recommended feeding program during gestation

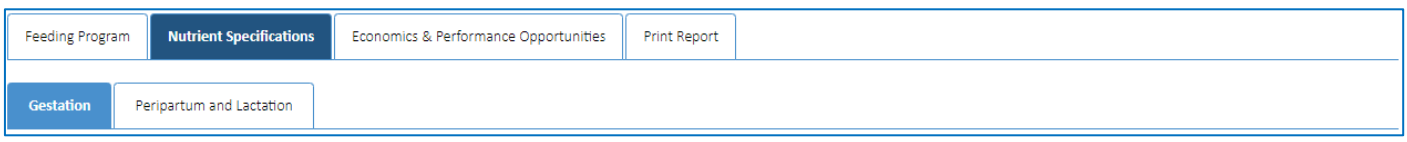
- PIC recommends ad libitum feed access during the entire lactation period. Gilts are expected to have 15 to 20% less feed intake compared to sows
- Please refer to the nutrient specification tab for the necessary adjustments in the nutrient specifications of the lactation diet(s), or consult your nutritionist

2.1.4. **Wean to service.** The wean to service feeding guide is provided in table categorized based on body condition (i.e., thin sows, and normal and fat sows) and calculated from user-defined dietary energy of gestation diet. Side by side with the recommended feeding levels are the current levels for comparison. See results of the exercise below.

The WSI feeding guide is based on the user-defined energy level of the gestation diet. The gestation diet can be used during this period.

	PIC Recommendation (kg/d)	Exercise A Current Feeding Level (kg/d)
Normal and Fat	2.9	3.0
Thin	Ad libitum	

2.2. **Nutrient specifications.** This includes the recommended nutrient specifications for gestation and lactation diets. For gestation, specifications are calculated from the recommended feeding levels. For lactation, specifications are calculated from the predicted lactation feed intake.



Recommended daily ME intake of gestating gilts and sows

	ME Intake (Mcal/d)	Exercise A-defined ME Mcal/kg
Ideal	5.90	
Thin	8.00	3.00
Fat	4.90	

Dietary SID AA (%) and SID AA ratio to SID Lys requirements

SID Amino Acids	Ratio to SID Lys	%
Lysine, %	100	0.56
Methionine + cysteine:Lysine	70	0.39
Threonine:Lysine	76	0.43
Tryptophan:Lysine	19	0.11
Valine:Lysine	71	0.40
Isoleucine:Lysine	58	0.32
Leucine:Lysine	92	0.51
Histidine:Lysine	35	0.20
Phenylalanine + tyrosine:Lysine	96	0.54
Max. inclusion of L-Lysine-HCl, %		0.25

Dietary mineral and vitamin requirements

Macro-minerals	
Total calcium, %	0.7894737
Av. Phosphorus, %	0.3715170
STTD Phosphorus, %	0.4086687
Sodium, %	0.2229102
Chloride, %	0.2229102

Trace minerals	
Zinc, ppm	125.00
Iron, ppm	100.00
Manganese, ppm	50.00
Copper, ppm	15.00
Iodine, ppm	0.35
Selenium, ppm	0.30

Vitamins	
Vitamin A, IU/kg	9,920.0
Vitamin D, IU/kg	1,985.0
Vitamin E, IU/kg	66.0
Vitamin K (menadione), mg/kg	4.4
Choline, mg/kg	660.0
Niacin, mg/kg	44.0
Riboflavin, mg/kg	10.0
Pantothenic acid, mg/kg	33.0
Vitamin B12	37.0
Folic Acid, mcg/kg	1,325.0
Biotin, mcg/kg	220.0
Thiamin, mg/kg	2.2
Vitamin B6 (Pyridoxine), mg/kg	3.3

Recommended daily energy and SID Lys intake of lactating gilts and sows

	Energy Intake	SID Lys Intake
Gilts	17.5 ME Mcal/d	50.00 g/d
Sows	20.7 ME Mcal/d	61.80 g/d
Herd	20.1 ME Mcal/d	59.50 g/d

Dietary energy levels

	Herd
Metabolizable Energy, kcal/kg	3,300

Dietary SID AA (%) and SID AA ratio to SID Lys requirements

Standardized Ileal Digestible amino acids	Ratio	Herd
Lysine, %	100	1.04
Methionine + cysteine:Lysine	53	0.55
Threonine:Lysine	64	0.67
Tryptophan:Lysine	19	0.20
Valine:Lysine	64	0.67
Isoleucine:Lysine	56	0.58
Leucine:Lysine	114	1.19
Histidine:Lysine	40	0.42
Phenylalanine + tyrosine:Lysine	113	1.17
Max. inclusion of L-Lysine-HCl, %		0.45

Dietary mineral and vitamin requirements

Item	Herd
Total calcium, %	0.89
Av. Phosphorus, %	0.42
STTD Phosphorus, %	0.46
Sodium, %	0.25
Chloride, %	0.25

Trace minerals	
Zinc, ppm	125.00
Iron, ppm	100.00
Manganese, ppm	50.00
Copper, ppm	15.00
Iodine, ppm	0.35
Selenium, ppm	0.30

Vitamins	
Vitamin A, IU/kg	9,920.0
Vitamin D, IU/kg	1,985.0
Vitamin E, IU/kg	66.0
Vitamin K (menadione), mg/kg	4.4
Choline, mg/kg	660.0
Niacin, mg/kg	44.0
Riboflavin, mg/kg	10.0
Pantothenic acid, mg/kg	33.0
Vitamin B12	37.0
Folic Acid, mcg/kg	1,325.0
Biotin, mcg/kg	220.0
Thiamin, mg/kg	2.2
Vitamin B6 (Pyridoxine), mg/kg	3.3

In this exercise, since there is a common lactation diet, only one specification (as herd) is provided by the tool; otherwise, a separate specification will be provided for lactation gilt and sows)

2.3. **Performance and economic opportunities.** This includes the opportunities in feed per sow per year, feed costs per sow per year, and pigs weaned per sow per year compared to the existing program. Feed savings can be achieved from the difference in feeding program, whereas PWSY improvement comes from an increase in percentage of females in ideal body condition.

Amount of feeds per sow per year

	PIC Recommendation		Exercise A Current	
	Total (kg/sow/year)	%	Total (kg/sow/year)	%
Gestation	693	66%	799	70%
Lactation	353	34%	344	30%
Total	1046		1143	

Exercise A uses +97 kg feeds per sow per year compared to PIC recommendations, this is equivalent to an economic opportunity of:

₱1880.9/sow/year

Exercise A can potentially improve its piglets weaned per sow per year using the PIC recommendations by:

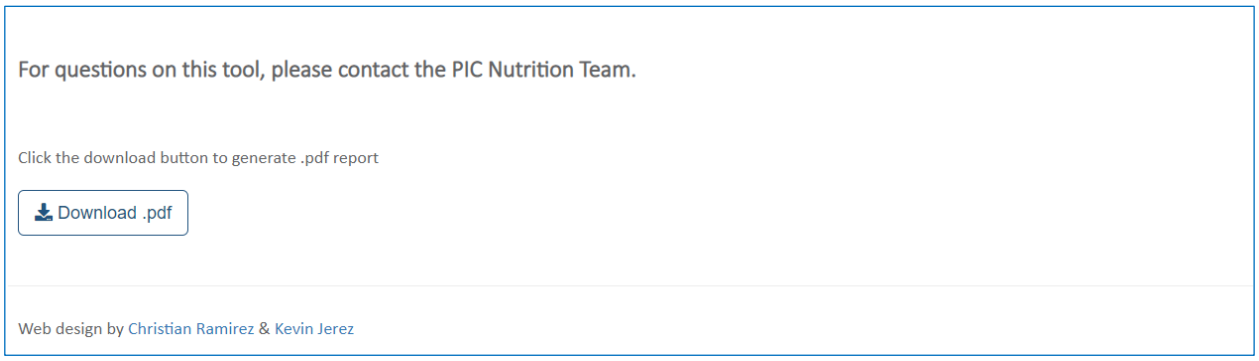
0.61

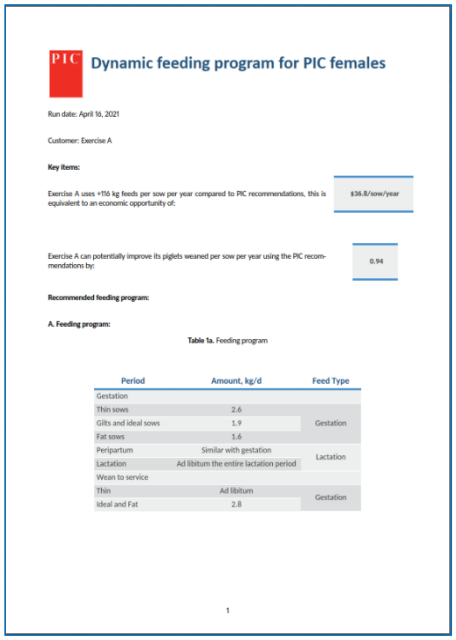
KPI for monitoring: Feeds per piglet weaned, kg

Piglet per sow per year	22	23	24	25	26	27	28	29	30	31	32
Amount of sow feeds per piglet weaned, kg	47.5	45.5	43.6	41.8	40.2	38.7	37.4	36.1	34.9	33.7	32.7
Gestation	31.5	30.1	28.9	27.7	26.7	25.7	24.8	23.9	23.1	22.4	21.7
Lactation	16.0	15.3	14.7	14.1	13.6	13.1	12.6	12.2	11.8	11.4	11.0

This table is an indicator of efficiency. Corresponding to any given PWSY is the optimum amount of feeds per piglet weaned achieved by following PIC feeding recommendation.

2.4. **Print report.** The tool allows a printable report to be downloaded by clicking the **download .pdf** button. Input parameters and outputs are not saved in the web application.





PIC **Dynamic feeding program for PIC females**

Run date: April 16, 2021

Customer: Exercise A

Key items:

Exercise A uses +116 kg feeds per sow per year compared to PIC recommendations, this is equivalent to an economic opportunity of: $36.8/sow/year

Exercise A can potentially improve its piglets weaned per sow per year using the PIC recommendations by: 0.94

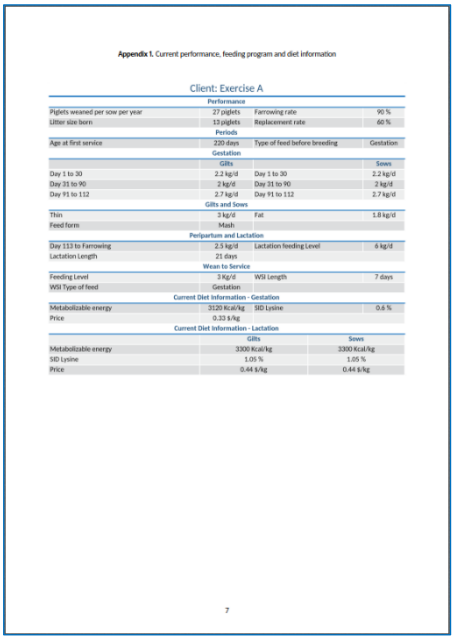
Recommended feeding program:

A. Feeding program:

Table 1a. Feeding program

Period	Amount, kg/d	Feed Type
Gestation		
Thin sows	2.6	Gestation
Gilts and ideal sows	1.9	
Fat sows	1.6	
Peripartum	Similar with gestation	Lactation
Lactation	Ad libitum the entire lactation period	
Wean to service		
Thin	Ad libitum	Gestation
Ideal and Fat	2.8	

1



Appendix 1. Current performance, feeding program and diet information

Client: Exercise A

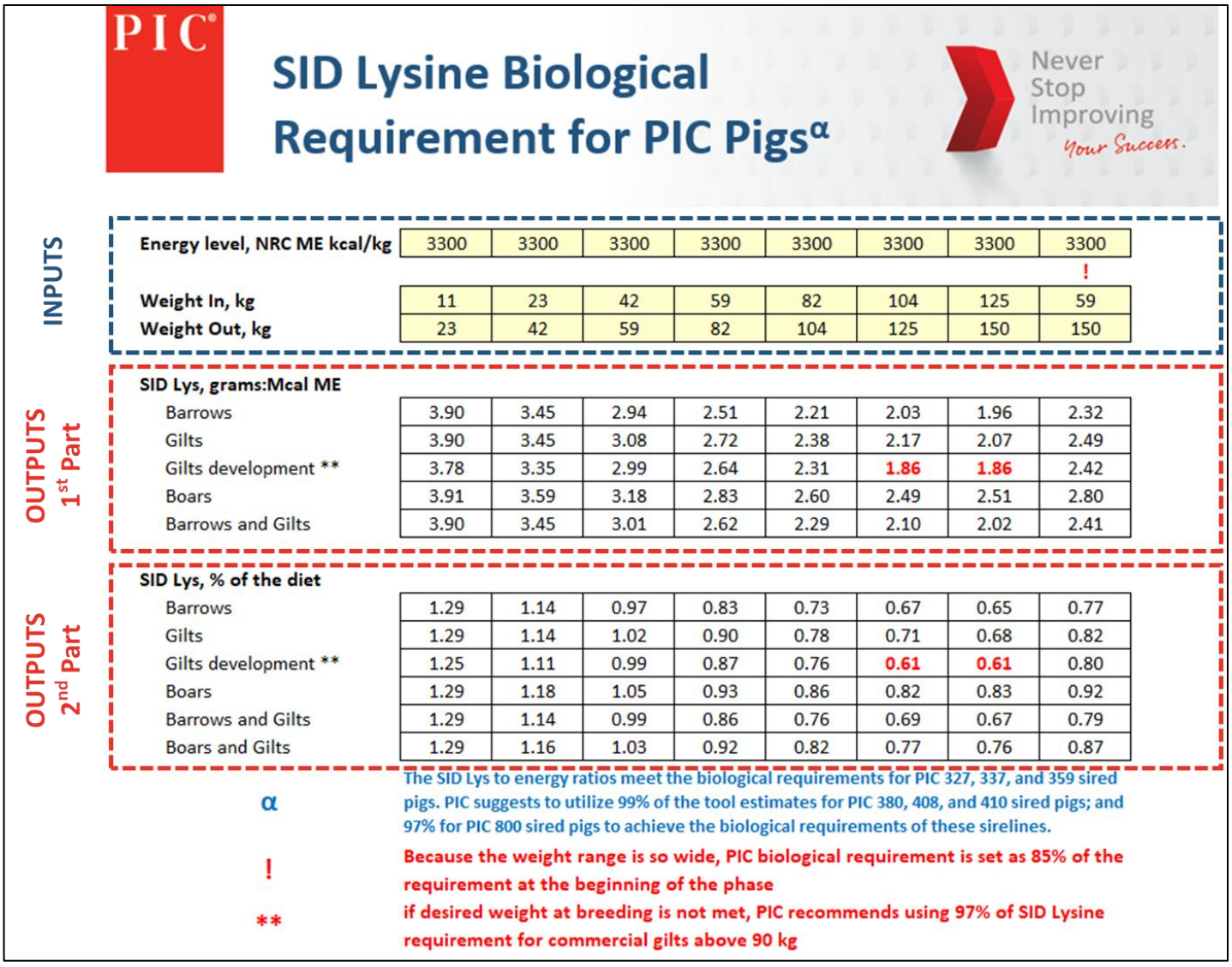
Performance			
Piglets weaned per sow per year	27 piglets	Farrowing rate	90 %
Litter size born	15 piglets	Replacement rate	60 %
Periods			
Age at first service	220 days	Type of feed before breeding	Gestation
Gestation			
	Gilts		Sows
Day 1 to 30	2.2 kg/d	Day 1 to 30	2.2 kg/d
Day 31 to 90	2 kg/d	Day 31 to 90	2 kg/d
Day 91 to 112	2.7 kg/d	Day 91 to 112	2.7 kg/d
Gilts and Sows			
Thin	3 kg/d	Fat	1.8 kg/d
Feed form	Mash		
Peripartum and Lactation			
Day 113 to Farrowing	2.5 kg/d	Lactation feeding Level	6 kg/d
Lactation Length	21 days		
Wean to Service			
Feeding Level	3 Kg/d	WSI Length	7 days
WSI Type of feed	Gestation		
Current Diet Information - Gestation			
Metabolizable energy	3120 Kcal/kg	SID Lysine	0.6 %
Price	0.33 $/kg		
Current Diet Information - Lactation			
	Gilts		Sows
Metabolizable energy	3300 Kcal/kg		3300 Kcal/kg
SID Lysine	1.05 %		1.05 %
Price	0.44 $/kg		0.44 $/kg

7

A pdf report is available for download. The report is 7 pages, with **the summary in first page containing the economic and performance opportunities and the feeding guide table**, and the input parameters in the last page as appendix.

SID Lysine Biological Requirement for PIC Pigs

- The overall layout of the SID Lysine Biological Requirement for PIC Pigs Tool is shown below.



PIC

SID Lysine Biological Requirement for PIC Pigs[α]

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INPUTS

Energy level, NRC ME kcal/kg	3300	3300	3300	3300	3300	3300	3300	3300 !
Weight In, kg	11	23	42	59	82	104	125	59
Weight Out, kg	23	42	59	82	104	125	150	150

OUTPUTS 1st Part

SID Lys, grams:Mcal ME								
Barrows	3.90	3.45	2.94	2.51	2.21	2.03	1.96	2.32
Gilts	3.90	3.45	3.08	2.72	2.38	2.17	2.07	2.49
Gilts development **	3.78	3.35	2.99	2.64	2.31	**1.86**	**1.86**	2.42
Boars	3.91	3.59	3.18	2.83	2.60	2.49	2.51	2.80
Barrows and Gilts	3.90	3.45	3.01	2.62	2.29	2.10	2.02	2.41

OUTPUTS 2nd Part

SID Lys, % of the diet								
Barrows	1.29	1.14	0.97	0.83	0.73	0.67	0.65	0.77
Gilts	1.29	1.14	1.02	0.90	0.78	0.71	0.68	0.82
Gilts development **	1.25	1.11	0.99	0.87	0.76	**0.61**	**0.61**	0.80
Boars	1.29	1.18	1.05	0.93	0.86	0.82	0.83	0.92
Barrows and Gilts	1.29	1.14	0.99	0.86	0.76	0.69	0.67	0.79
Boars and Gilts	1.29	1.16	1.03	0.92	0.82	0.77	0.76	0.87

α The SID Lys to energy ratios meet the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests to utilize 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sirelines.

! Because the weight range is so wide, PIC biological requirement is set as 85% of the requirement at the beginning of the phase

** if desired weight at breeding is not met, PIC recommends using 97% of SID Lysine requirement for commercial gilts above 90 kg

Inputs:

1. Open the appropriate tool according to the energy system being used. For this exercise, we will utilize the ME system (metabolizable energy).
2. Select the Imperial-ME tab.
3. Enter the desired weight ranges and energy levels according to the number of phases being utilized.
    a. For exercise, we will use seven different dietary phases as follow:
        i. Phase 1: 11 to 23 kg
        ii. Phase 2: 23 to 41 kg
        iii. Phase 3: 41 to 59 kg
        iv. Phase 4: 59 to 82 kg
        v. Phase 5: 82 to 104 kg
        vi. Phase 6: 104 to 125 kg
        vii. Phase 7: 125 to 150 kg
    b. The energy concentration in all phases are 3,300 kcal ME/kg

Energy level, NRC ME kcal/kg	3300	3300	3300	3300	3300	3300	3300
Weight In, kg	11	23	41	59	82	104	125
Weight Out, kg	23	41	59	82	104	125	150

Outputs:

1st Part:

SID Lys, grams:Mcal ME							
Barrows	3.90	3.47	2.96	2.52	2.21	2.01	1.96
Gilts	3.90	3.47	3.10	2.73	2.38	2.14	2.07
Gilts development **	3.78	3.37	3.00	2.64	2.31	**1.86**	**1.86**
Boars	3.91	3.60	3.19	2.83	2.60	2.48	2.52
Barrows and Gilts	3.90	3.47	3.03	2.62	2.29	2.08	2.02

- The first part of the output will display the gender specific SID Lys recommendations in grams:Mcal ME based on the weight ranges defined by the user.
- The SID Lys:ME ratio recommended for developing gilts are estimated as 97% of the recommendations for a commercial gilt. If body weight is above 90 kg, the recommended lysine to calorie ratio for a developing gilt is similar to that of a gestation diet.
- The SID Lys to energy ratios meet the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests to utilize 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sirelines.

2nd Part:

- If the energy level is entered, the tool outputs the SID Lys recommendations for PIC pigs on a percentage of the diet basis.

SID Lys, % of the diet								
Barrows	1.29	1.14	0.98	0.83	0.73	0.67	0.65	0.77
Gilts	1.29	1.14	1.02	0.90	0.78	0.71	0.68	0.82
Gilts development **	1.25	1.11	0.99	0.87	0.76	**0.61**	**0.61**	0.80
Boars	1.29	1.19	1.05	0.93	0.86	0.82	0.83	0.92
Barrows and Gilts	1.29	1.14	1.00	0.86	0.76	0.69	0.67	0.79
Boars and Gilts	1.29	1.17	1.04	0.92	0.82	0.77	0.76	0.87

Notes:

- If the weight range of a phase is too wide, a red exclamation point will show up (**!**) above the weight break of that specific phase.

Energy level, NRC ME kcal/kg	3300
	!
Weight In, kg	59
Weight Out, kg	150

- This exclamation point will inform the user that because the weight range is so wide, the PIC recommendations for lysine and phosphorus are set as 85% of the biological recommendations at the beginning of that phase. This is to reduce the likelihood of abnormal behavior development.

Background Information:

- A meta-analysis based on 29 trials conducted between 2013 and 2020 under commercial conditions with 48,388 PIC pigs was developed to determine the SID Lys requirement of 11- to 150-kg pigs.
- The model was developed for mixed gender pigs (barrows and gilts) and the requirement of barrows and gilts were estimated based on the expected differences according to the PIC 337 growth curve.
- Requirement estimates were determined using the breakpoints from the broken-line models, which were 98 to 98.5% of the maximum responses indicated by the quadratic polynomial models.
- The requirement estimates are expected to achieve ~100% of maximum ADG and 99.4% of maximum G:F.
- The energy value of ingredients followed NRC (2012) nutrient composition.

SID Lysine Economic Tool for PIC Pigs

- The overall layout of the SID Lysine Economic Tool for PIC Pigs is shown below.

PIC®

SID Lysine Economic Tool for PIC Pigs[α]

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Input *(please fill yellow cells)*

Economic evaluation criteria	Live
Live pig price, Php/kg	₱210.00
Facility cost, Php/pig/day	₱7.00

			Current diets			Biological requirement	
Phase	**Initial weight, kg**	**Final weight, kg**	**Energy, kcal ME/kg**	**SID Lys, %**	**Php/tonne**	**SID Lys, %**	**Php/tonne**
1	25	45	3,300	1.01	₱22,922.32	**1.12**	₱23,430.61
2	45	70	3,250	0.84	₱21,079.80	**0.93**	₱21,487.88
3	70	105	3,200	0.68	₱19,726.26	**0.76**	₱20,045.45

Performance and economics output - Fixed Weight (space long)

Using PIC biological requirement levels will increase the current growth rate by 2.41% and improve feed efficiency by 2.73%, resulting in gains of Php49.27 per pig in IOFFC given the current ingredients and pig prices.

In this scenario, it is economical to feed PIC SID Lysine biological levels.

Performance and economics output - Fixed Time (space short)

Using PIC biological requirement levels will increase the current growth rate by 2.45% and improve feed efficiency by 2.66%, resulting in gains of Php359.53 per pig in IOFC given the current ingredients and pig prices.

In this scenario, it is economical to feed PIC SID Lysine biological levels.

α **The SID Lys to energy ratios meet the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests to utilize 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sirelines.**

To be used by trained swine nutritionists. Biological requirements are an average between average daily gain and feed efficiency. Background performance equations are based on a meta-analysis from 29 commercial experiments with a total of 48,383 PIC pigs. Other environmental factors can influence daily nutrient requirements and must be adjusted for each production system to avoid behavioral or welfare issues. The above are only estimates and not guarantees of performance or costs. For questions on this calculator please contact the PIC nutrition team.

Assumptions:

Prices:

Corn, Php/kg	17.17
Wheat, Php/kg	18.07
US Soybean Meal, Php/kg	26.50
Rice Bran D1, Php/kg	11.58
Copra Meal, Php/kg	13.75
Coconut Oil, Php/kg	76.50

Inputs:

1. Open the appropriate tool according to the energy system being used. For this exercise, we will utilize the ME system (metabolizable energy).
2. Select the economic evaluation criteria (carcass basis or live basis). For this exercise, we will utilize live basis.
3. Enter the information of Live pig price and facility cost.

Economic evaluation criteria	Live
Live pig price, Php/kg	₱210.00
Facility cost, Php/pig/day	₱7.00

4. Enter the desired weight ranges and energy levels according to the number of phases being utilized. The tool will then automatically display in the gray cells the percentage SID Lys biological requirement based on the energy concentrations and body weight ranges.
    a. For exercise, we will use 3 different dietary phases as follow:
        i. Phase 1: 25 to 45 kg; ME = 3300 kcal/kg
        ii. Phase 2: 45 to 70 kg; ME = 3250 kcal/kg
        iii. Phase 3: 70 to 105 kg; ME = 3000 kcal/kg

The reported SID Lys concentrations meet the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests utilizing 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sirelines.

5. The next step includes information regarding the user current diets. Enter the concentration of lysine currently being used in each diet and the respective costs per tonne.
    a. **For this exercise, current diets are formulated to contain 90% of the biological requirement for maximal growth performance of PIC 337 pigs.**

			Current diets			Biological requirement	
Phase	**Initial weight, kg**	**Final weight, kg**	**Energy, kcal ME/kg**	**SID Lys, %**	**Php/tonne**	**SID Lys, %**	**Php/tonne**
1	25	45	3,300	1.01	₱22,922.32	**1.12**	
2	45	70	3,250	0.84	₱21,079.80	**0.93**	
3	70	105	3,200	0.68	₱19,726.26	**0.76**	

6. The user then needs to re-formulate their diets to the PIC SID Lys Biological requirements (displayed in the grey cells) using the same energy concentrations and input the updated costs per tonne.
7.

			Current diets			Biological requirement	
Phase	Initial weight, kg	Final weight, kg	Energy, kcal ME/kg	SID Lys, %	Php/tonne	SID Lys, %	Php/tonne
1	25	45	3,300	1.01	₱22,922.32	**1.12**	₱23,430.61
2	45	70	3,250	0.84	₱21,079.80	**0.93**	₱21,487.88
3	70	105	3,200	0.68	₱19,726.26	**0.76**	₱20,045.45

Outputs:

Performance and economics output - Fixed Weight (space long)
Using PIC biological requirement levels will increase the current growth rate by 2.41% and improve feed efficiency by 2.73%, resulting in gains of Php49.27 per pig in IOFFC given the current ingredients and pig prices.
In this scenario, it is economical to feed PIC SID Lysine biological levels.

Performance and economics output - Fixed Time (space short)
Using PIC biological requirement levels will increase the current growth rate by 2.45% and improve feed efficiency by 2.66%, resulting in gains of Php359.53 per pig in IOFC given the current ingredients and pig prices.
In this scenario, it is economical to feed PIC SID Lysine biological levels.

- The tool will output the expected improvements in performance by changing the current SID Lys levels (90% of the biological requirement in this exercise) to the PIC Biological SID Lys requirements.
- These results are displayed for a fixed weight scenario (when long in space) or a fixed time scenario (when short in space).
- The tool will also output what are the expected gains or losses in income over feed and facility costs for a fixed weight system and in income over fixed cost for a fixed time system. These results are driven by the expected changes in performance, ingredient/diet costs, and pig prices.
- In the example above, following PIC Biological SID Lys requirement would increase the current growth rate by 2.41% and improve the current feed efficiency by 2.73%, resulting in gains of Php 49.3 per pig when the system is working on fixed weight basis.
- In the example above, following PIC Biological SID Lys requirement would increase the current growth rate by 2.45 % and improve the current feed efficiency by 2.45%, resulting in gains of Php 359.53 per pig when the system is working on fixed time basis.

Thus, it would be economical to use PIC Biological SID Lys levels in fixed time and fixed weight scenarios, when considering the live weight price of 210 Php/kg

STTD Phosphorus Biological Requirement for PIC Pig

- The overall layout of the STTD P or AvP Biological Tool for PIC Pigs is shown below.

PIC®

STTD Phosphorus Biological Requirement for PIC Pigs[α]

Never Stop Improving *Your Success.*

INPUTS

Energy level, NRC ME kcal/kg	3300	3300	3300	3300	3300	3300		
Weight In, kg	11	23	41	59	82	104		
Weight Out, kg	23	41	59	82	104	129		

OUTPUTS 1ST Part

STTD P, grams:Mcal ME								
Commercial Barrows	1.32	1.20	1.05	0.91	0.81	0.74		
Commercial Gilts	1.32	1.20	1.09	0.99	0.87	0.79		
Commercial Boars	1.32	1.24	1.14	1.02	0.89	0.81		
Barrows and Gilts	1.32	1.20	1.07	0.95	0.84	0.77		
Developing Gilts	1.43	1.30	1.18	1.06	0.94	0.85		

OUTPUTS 2nd Part

STTD P, % of the diet								
Commercial Barrows	0.44	0.40	0.35	0.30	0.27	0.24		
Commercial Gilts	0.44	0.40	0.36	0.33	0.29	0.26		
Commercial Boars	0.44	0.41	0.38	0.34	0.30	0.27		
Barrows and Gilts	0.44	0.40	0.35	0.31	0.28	0.25		
Boars and Gilts	0.44	0.40	0.37	0.33	0.29	0.26		
Developing Gilts	0.47	0.43	0.39	0.35	0.31	0.28		

α The STTD P to energy ratios meet the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests to utilize 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sirelines.

Inputs:

1. Open the appropriate tool according to the energy system being used. For this exercise, we will utilize the ME system (metabolizable energy).
2. Select the STTD P Metric-ME tab.
3. Enter the desired weight ranges and energy levels according to the number of phases being utilized.
    a. For exercise, we will use six different dietary phases as follow:
        i. Phase 1: 11 to 23 kg
        ii. Phase 2: 23 to 41 kg
        iii. Phase 3: 41 to 59 kg
        iv. Phase 4: 59 to 82 kg
        v. Phase 5: 82 to 104 kg
        vi. Phase 6: 104 to 129 kg
    b. The energy concentration in all phases is 3,300 kcal ME/kg

Energy level, NRC ME kcal/kg	3300	3300	3300	33300	3300	3300
Weight In, kg	11	23	41	59	82	104
Weight Out, kg	23	41	59	82	104	129

Outputs:

1st Part:

STTD P, grams:Mcal ME						
Commercial Barrows	1.32	1.20	1.05	0.91	0.81	0.74
Commercial Gilts	1.32	1.20	1.09	0.99	0.87	0.79
Commercial Boars	1.32	1.24	1.14	1.02	0.90	0.81
Barrows and Gilts	1.32	1.20	1.07	0.95	0.84	0.77
Developing Gilts	1.43	1.29	1.18	1.06	0.94	0.86

- The first part of the output will display the gender specific STTD P recommendations in grams:Mcal ME based on the weight ranges defined by the user.
- The STTD P:ME ratio recommended for developing gilts are estimated as 108% of the recommendations for a commercial gilt to maximize bone mineralization.
- The STTD P to energy ratios meet the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests utilizing 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sire lines.

2nd Part:

- If the energy level is entered, the tool outputs the STTD P recommendations for PIC pigs on a percentage of the diet basis.

STTD P, % of the diet						
Commercial Barrows	0.44	0.40	0.35	3.03	0.27	0.24
Commercial Gilts	0.44	0.40	0.36	3.28	0.29	0.26
Commercial Boars	0.44	0.41	0.38	3.39	0.30	0.27
Barrows and Gilts	0.44	0.40	0.35	3.16	0.28	0.25
Boars and Gilts	0.44	0.40	0.37	3.34	0.29	0.26
Developing Gilts	0.47	0.43	0.39	3.54	0.31	0.28

Notes:

- The available phosphorus recommendations are estimated as 86% of the STTD P recommendations in a corn-soybean meal-diet using P digestibility coefficients and P bioavailability from NRC (1998 and 2012).

Background Information:

- Three trials were conducted in partnership with Kansas State University under commercial conditions with 4,350 PIC mixed gender pigs each to determine the STTD P requirement of 11- to 132-kg pigs.
- The requirement estimates were developed for mixed gender pigs (barrows and gilts) and the requirement of commercial barrows and gilts and commercial boars were estimated based on the expected differences according to the PIC 337 growth curve.
- The energy value of ingredients followed NRC (2012) nutrient composition.

Economic Model for Optimum Phosphorus Levels

- Overall layout of the Economic Model for Optimum Phosphorus Levels is shown below.

Economic model for optimum phosphorus levels v2.0[α]

PIC

Input *(please fill yellow cells)*

Economic evaluation criteria	Live
Live pig price, Php/kg	₱210.00
Facility cost, Php/pig/day	₱7.00

			Current diets			Biological requirement	
Phase	**BW, kg**		**Energy, kcal ME/kg**	**STTD P, %**	**Php/tonne**	**STTD P, %**	**Php/tonne**
1	25	45	3,300	0.35	₱23,262.63	**0.39**	₱23,430.61
2	45	70	3,250	0.30	₱21,373.74	**0.33**	₱21,487.88
3	70	105	3,200	0.25	₱20,010.10	**0.28**	₱20,045.45

Performance and economics output - Fixed Weight (space long)

Using PIC biological requirement levels will increase the current growth rate by 0.51% and improve feed efficiency by 0.10%; however, resulting in losses of Php10.93 per pig in IOFFC given the current ingredients and pig prices.

In this scenario, it isn't economical to feed PIC STTD phosphorus biological levels.

Performance and economics output - Fixed Time (space short)

Using PIC biological requirement levels will increase the current growth rate by 0.51% and improve feed efficiency by 0.10%, resulting in gains of Php49.71 per pig in IOFC given the current ingredients and pig prices.

In this scenario, it is economical to feed PIC STTD phosphorus biological levels.

α **The STTD P to to energy ratios meet the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests to utilize 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sirelines.**

Assumptions:

Prices:

Corn, Php/kg	17.17
Wheat, Php/kg	18.07
US Soybean Meal, Php/kg	26.50
Rice Bran D1, Php/kg	11.58
Copra Meal, Php/kg	13.75
Coconut Oil, Php/kg	76.50

INPUTS

1. Open the appropriate tool according to the energy system being used. For this exercise, we will utilize the ME system (metabolizable energy).
2. Select the economic evaluation criteria (carcass basis or live basis). For this exercise, we will utilize live basis
3. Enter the information of live weight price and facility cost.

Economic evaluation criteria	Live
Live pig price, Php/kg	₱210.00
Facility cost, Php/pig/day	₱7.00

4. Enter the desired weight ranges and energy levels according to the number of phases being utilized. The tool will then automatically display in the purple cells the percentage STTD P biological requirement based on the energy concentrations and body weight ranges. Please pay attention that this tool is applicable for grow-finish pigs, so please set the initial body weight at or above 23 kg.

    a. For exercise, we will use 3 different dietary phases as follow:
        i. Phase 1: 25 to 45 kg; ME = 3300 kcal/kg
        ii. Phase 2: 45 to 70 kg; ME = 3250 kcal/kg
        iii. Phase 3: 70 to 105 kg; ME = 3000 kcal/kg

The STTD P to energy ratios meets the biological requirements for PIC 327, 337, and 359 sired pigs. PIC suggests utilizing 99% of the tool estimates for PIC 380, 408, and 410 sired pigs; and 97% for PIC 800 sired pigs to achieve the biological requirements of these sirelines.

5. The next step includes information regarding the user current diets. Enter the concentration of STTD P currently being used in each diet and the respective costs per ton.

			Current diets			Biological requirement	
Phase	BW, kg		Energy, kcal ME/kg	STTD P, %	Php/tonne	STTD P, %	Php/tonne
1	25	45	3,300	0.35	₱23,262.63	**0.39**	
2	45	70	3,250	0.30	₱21,373.74	**0.33**	
3	70	105	3,200	0.25	₱20,010.10	**0.28**	

6. The user then needs to re-formulate their diets to the PIC STTD P Biological requirements (displayed in the purple cells) using the same energy concentrations and input the updated costs per ton.

			Current diets			Biological requirement	
Phase	BW, kg		Energy, kcal ME/kg	STTD P, %	Php/tonne	STTD P, %	Php/tonne
1	25	45	3,300	0.35	₱23,262.63	**0.39**	₱23,430.61
2	45	70	3,250	0.30	₱21,373.74	**0.33**	₱21,487.88
3	70	105	3,200	0.25	₱20,010.10	**0.28**	₱20,045.45

Outputs:

Performance and economics output - Fixed Weight (space long)
Using PIC biological requirement levels will increase the current growth rate by 0.51% and improve feed efficiency by 0.10%; however, resulting in losses of Php10.93 per pig in IOFFC given the current ingredients and pig prices. **In this scenario, it isn't economical to feed PIC STTD phosphorus biological levels.**

Performance and economics output - Fixed Time (space short)
Using PIC biological requirement levels will increase the current growth rate by 0.51% and improve feed efficiency by 0.10%, resulting in gains of Php49.71 per pig in IOFC given the current ingredients and pig prices. **In this scenario, it is economical to feed PIC STTD phosphorus biological levels.**

7. Performance outputs

- The tool will output the expected change in performance by changing the current STTD P levels (NRC 2012 recommendations) to the PIC Biological STTD P requirements.
- The performance outputs are displayed for a fixed weight scenario (when long in space) or a fixed time scenario (when short in space).
- The tool will also output what are the expected gains or losses in income over feed and facility costs for a fixed weight system and in income over fixed cost for a fixed time system. These results are driven by the expected changes in performance, ingredient/diet costs, and pig prices.

- In the example above, following PIC Biological STTD P requirement would increase the current growth rate by 0.51%, improve the current feed efficiency by 0.10 %, resulting in losses of 10.93 Php per pig when the system is working on fixed weight basis.

- In the example above, following PIC Biological STTD P requirement would increase the current growth rate by 0.51 % and improve the current feed efficiency by 0.10 %, resulting in gains of 49.7 Php per pig when the system is working on fixed time basis.

Thus, it would not be economical to use PIC Biological STTD P levels in a fixed time scenario when considering a live weight price of 210 Php/kg

Feed Budget Tool for PIC 337 (and PIC 800) Sired Pigs

Overall layout of the Feed Budget tools for PIC 337 or PIC 800 Sire Pigs is shown below.

Please fill yellow cells

	Mixed Gender							
Version	**Metric**							
Age at beginning, days	29							
ADG, g/day	750							
F/G	2.35							
Mixed gender								
Energy level, NRC ME kcal/kg	3,450	3,400	3,350	3,300	3,250	3,200		
Weight In, kg	7.5	11.0	16.0	24.0	46.0	73.0		
Weight Out, kg	11.0	16.0	24.0	46.0	73.0	99.0		
g SID Lys:Mcal of NRC ME	4.12	4.02	3.82	3.40	2.84	2.39		
Feed Budget, kg/pig	4.0	7.0	13.2	43.7	68.6	78.5		
Days on feed	10	11	14	28	30	29		

Inputs:

1. Open the appropriate tool based on the desired sireline (337 or 800). For this exercise, we will utilize the Feed Budget Tool for PIC 337 pigs.
2. Select the appropriate version of the tool (Imperial or Metric).
3. The first part of the inputs requires user specific information regarding the desired or current performance.
    a. For this exercise, we will utilize a wean-to-finish scenario where:
        i. Age at beginning is 29 days (corresponding to weaning age of d 28)
        ii. Current growth rate is 750 g/d
        iii. Current feed efficiency is 2.35

	Mixed Gender
Version	**Metric**
Age at beginning, days	29
ADG, g/day	750
F/G	2.35

4. The next step includes the dietary energy and body weight range information for each dietary phase.
    a. For this exercise, we will utilize a wean-to-finish scenario with a 3-phase program in the nursery and a 3-phase program in the grow-finish (please see below).
    b. Weight ranges for phases 1 to 6 are: 7.5-11 kg, 11-16 kg, 16-24 kg, 24-46 kg, 46-73 kg and 73-99 kg of body weight.
    c. The energy concentration entered for all diets was 3450, 3400, 3350, 3300, 3250 and 3200 kcal ME/kg.

Mixed gender

Energy level, NRC ME kcal/kg	3,450	3,400	3,350	3,300	3,250	3,200
Weight In, kg	7.5	11.0	16.0	24.0	46.0	73.0
Weight Out, kg	11.0	16.0	24.0	46.0	73.0	99.0

Outputs:

- Once the input information is entered, the tool will report the SID Lys to calorie ratio biological requirement for the weight range in each dietary phase as a reference.
- The tool then estimates the feed budget per pig (kg/pig) and estimated days on feed for each diet.

Mixed gender

Energy level, NRC ME kcal/kg	3,450	3,400	3,350	3,300	3,250	3,200
Weight In, kg	7.5	11.0	16.0	24.0	46.0	73.0
Weight Out, kg	11.0	16.0	24.0	46.0	73.0	99.0
g SID Lys:Mcal of NRC ME	4.12	4.02	3.82	3.40	2.84	2.39
Feed Budget, kg/pig	4.0	7.0	13.2	43.7	68.6	78.5
Days on feed	10	11	14	28	30	29

Notes and Background:

- The tool is applicable to wean-to-finish but also nursery and grow-finish phases alone. However, please make sure the performance parameters and age at beginning reflect the initial weight or phase entered in the tool.
- The growth curves for PIC sire pigs were utilized to create a baseline shape according to dietary energy level (Schinkel et al., 2012).
- Dietary energy was categorized as follow:
    - Low: below 3,220 kcal ME/kg
    - Medium: between 3,220 and 3,350 kcal ME/kg
    - High: above 3,350 kcal ME/kg
- A weighted average of the user energy levels within each phase is calculated to determine which baseline shape is used for calculations. The selected baseline shape is then adjusted according to the user current growth performance to determine the estimated feed budgets and days on feed.