SWINE NUTRITION & FEEDING

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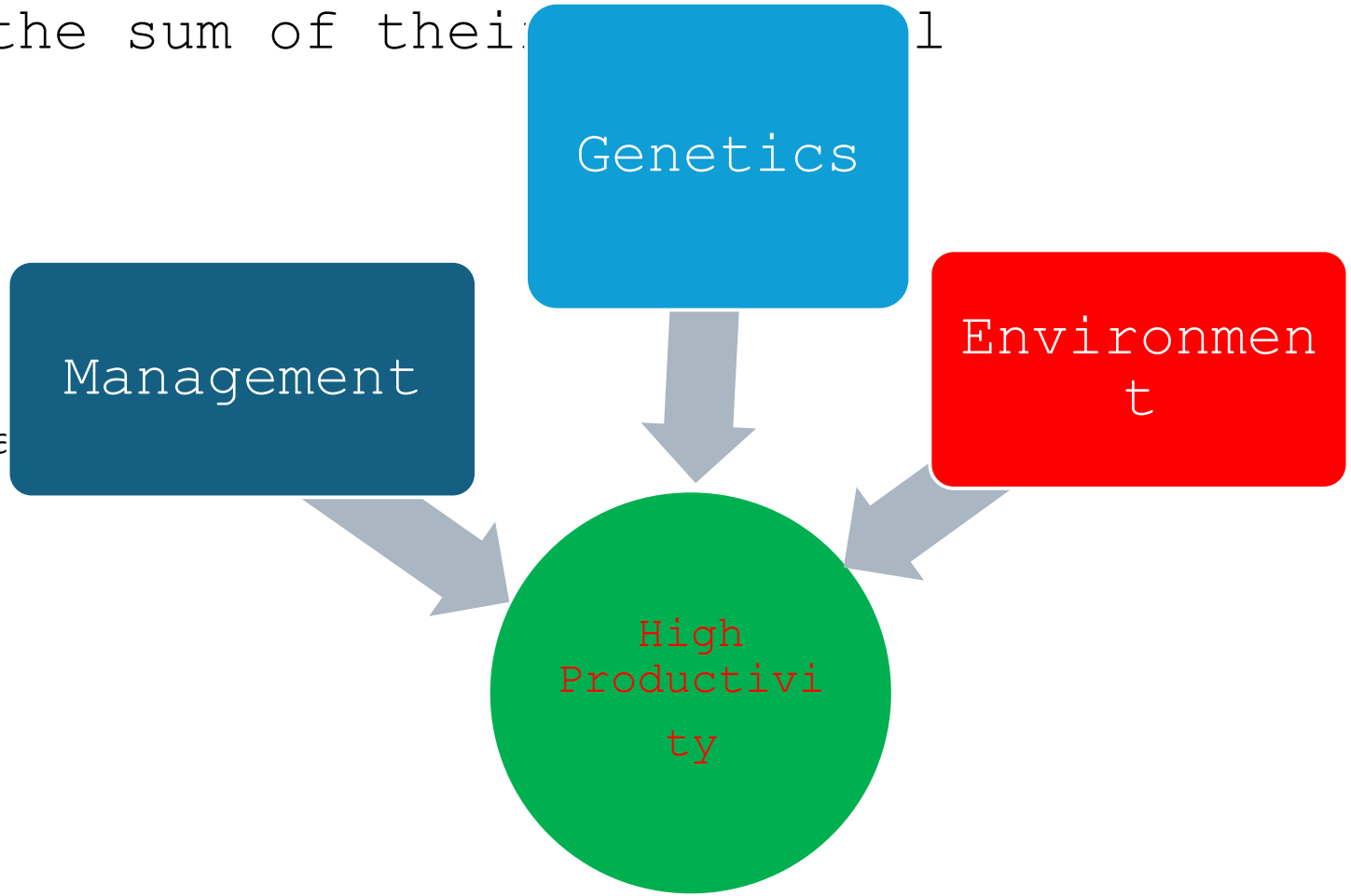
- INTRODUCTION
  - FACTORS AFFECTING PIG PRODUCTION
- PRINCIPLES OF FEEDING SWINE
  - MACRONUTRIENTS
  - MICRONUTRIENTS
- CONSIDERATIONS FOR FEEDING DIFFERENT CLASSES OF PIGS
  - NUTRIENT SPECIFICATIONS
  - FEED PRESENTATION
  - FREQUENCY OF FEEDING
- CONCLUSIONS

1. INTRODUCTION

What are the drivers of Success/Profit in a Pig Operation?

- This is 3 pronged and for the potential of an operation to be realized, all must work in synergy: their combined effect is greater than the sum of thei l effects.
  - ❖Animal
    - Genetics
  - ❖Management
    - Nutrition
    - Routine Husbandry pra
  - ❖Environment
    - Location
    - Housing
    - Equipment



2. PRINCIPLES OF SWINE NUTRITIO

- Feed is the largest production cost, accounting for >70% of costs in pig production
- An adequate nutrition program should be designed to;
  - Unlock the genetic potential of pigs/maximize performance
    - Average daily gain
    - Feed efficiency
  - Minimize cost of production
    - Feed cost per unit of gain
  - Maximize profitability

The pig’s nutritional requirements for optimal and healthy growth change and are influenced by factors such as:

Age and body weight

A weaner/young pig requires a diet higher in protein and energy than does a finisher pig or an adult pig.

Genetic potential of your pigs

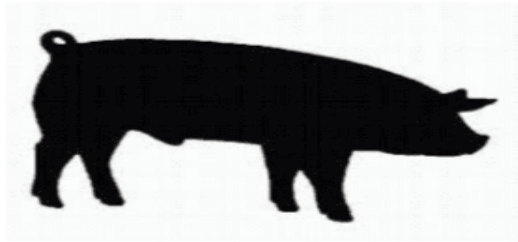
Fast growing breeds (e.g. Large White, Landrace, Duroc) require more protein in their diet than breeds that do not grow as fast (e.g. Berkshire, Hampshire).

Housing environment

- For example, if pigs are in a cold or hot environment; they will use more energy just to stay warm or cool, therefore to maintain growth higher levels of energy in the diet will be required.

Quantify Biology of Animals

Determine and Adjust Requirements



A. Feed Intake
   - Grow-finish
   - Lacatation

B. Productivity Level
   - Gestation: Sow body condition
   - Lactation
     - 21-day litter weight
     - Wean-to-estrus (Lactation wgt loss)
   - Nursery: ADG, Mortality/Morbidity
   - Grow-finish: ADG, Lean growth rates

Select Nutrient Sources

Ingredients & Feeding Program Options

A. Nutrient Density
B. Nutrient Bioavailability
C. Anti-nutritional Factors
D. Cost
E. Nutrient Quality & Variability
F. Maximum Inclusion Rate

Formulate Diets

Improve Non-nutritional Management

A. All-in/All-out
B. Split Sex Feeding
C. Wet-Dry Feeders
D. Biosecurity Practices

Maximize Quality Control Manufacture Feed

A. Processing
   - Grinding
     - Particle size
     - Ingredient separation
   - Pelleting
     - Ingredient separation

B. Mixing
C. Delivery
D. Storage
E. Check accuracy of nutrients in final diet

Monitor Performance & Costs

Compare to expected goals

Minimize Feed Waste

A. Feeder Design
B. Feeder Adjustment

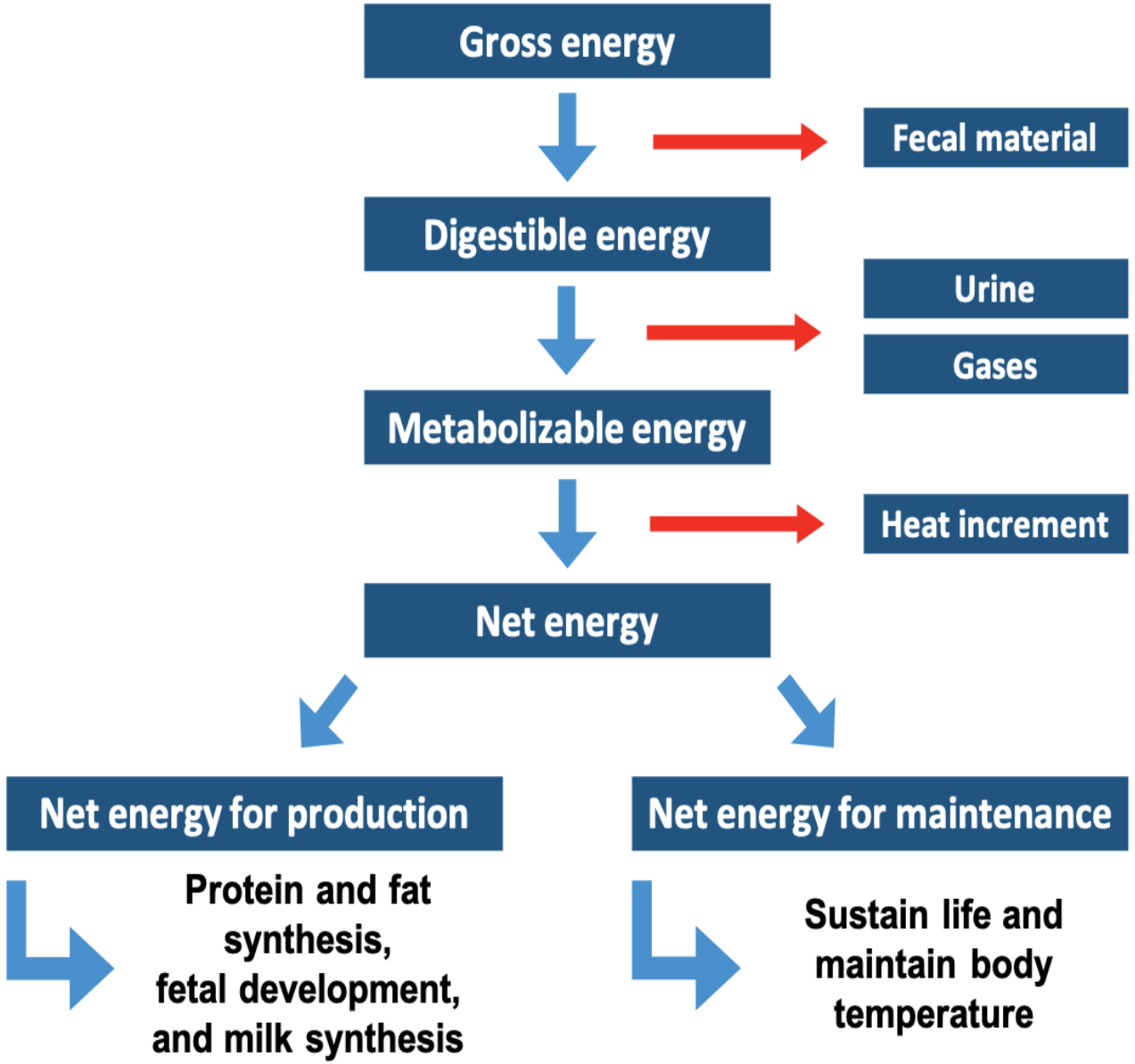
Farmer's Choice

Your Guarantee of Quality

MACRONUTRIENTS

❖ ENERGY

- The biggest cost of any diet
  - Grains
  - Milling by products
- Pigs increase/decrease feed intake to meet their energy needs depending on;
  - Energy & fiber content of diet
  - Feeding management, health status, environmental conditions



❖ PROTEINS & AMINO ACIDS

- 20 amino acids that make up proteins.
- Sources
  - Plant (Full fat soya, soya beans, SFM)
  - Animal (FM, MBM)
- Essential for efficient growth and reproduction
- Essential, non – essential and conditionally essential amino acids
- As pigs become more feed efficient with genetic improvement, the amino acid concentration needs to increase
- Although energy represents the major cost of any diet, a large portion of the response to energy depends on having adequate amino acids (Protein).

❖ MACROMINERALS

- Macro minerals typically supplemented in most swine diets include calcium (Ca), phosphorus (P), sodium, and chloride.
- Calcium (Ca) and phosphorus (P) are essential for lean tissue deposition, skeleton development and maintenance, and many metabolic functions.
- Sodium (Na) and chloride (Cl) are important for maintaining water and electrolytes' homeostasis, pH regulation, and nutrient absorption.
  - Greater concentrations of Na and Cl are required by nursery pigs, which is greatly reduced for grow-finish, gestating and lactating sows
- A deficiency of Na or Cl can reduce feed intake, average daily gain, and worsen feed efficiency.

❖ Trace Minerals and Vitamins

- Adequate amounts of trace minerals and vitamins important due to their various roles in regulatory functions.
- Feeding excess minerals or vitamins can result in toxicity and increased diet cost, whereas feeding inadequate concentrations can result in deficiencies and reduced performance (NRC, 2012; Dritz et al., 2019).
- Trace minerals commonly supplemented in swine diets include zinc, manganese, iron, copper, iodine and selenium.
- Vitamins play critical roles in various metabolic pathways of normal growth and reproduction. Proper concentrations of

❖ Water

Animal Category	Age	Weight Range (kg)	Requirements (l/day)	Nipple water pressure (l/min)
Suckling Piglets	1 - 28 days	1.4 - 9	0.6 - 0.85	0.5 - 1
Weaner piglet	4 - 7 weeks	9 - 19	1.5 - 2	0.5 - 1
Weaner Pig	7 - 10 weeks	20 - 35	3 - 4	1 - 2
Porker	10 - 16 weeks	36 - 80	6 - 8	1 - 2
Baconer	16 - 22	81 - 105	8 - 10	1 - 2
Gilt	7 - 8 Months	125 - 145	10 - 12	2 - 3
Dry sow	1 - 4 years	150 - 240	12 - 15	2 - 3
Lactating sow	1 - 4 years	160 - 260	15 - 32	3 - 4
A.I/ Breeding	9 - 36 months	145 - 300	12 - 16	2 - 3

Feeding In Gestation/Pregnancy

- Objectives - feed sow to ensure a litter size of at least 12 quality piglets, a specific gain in body weight and back fat thickness and to attain a body condition score of 3.5 at farrowing
- Pregnant sow should not be overfed during gestation as this lowers feed intake in lactation. Feeding levels of 2.0kg (gilts) to 2.5kg (sows)/day satisfactory dependent on housing conditions.
  - ***In early gestation*** *(Day 1–28)* the objective is to ensure the maximum number of quality embryos, as well as to replace the body reserves of the sow lost during lactation and in the period between weaning and mating.
  -
  - ***In mid-gestation*** *(Day 29–84)* there is an increase in energy requirements that can be met by a 0.15–0.20 kg/day increase in feed provided. Most of this increase is for maintenance and maternal body gain to ensure that the animal maintains the correct body condition.
  -
  - ***In late gestation*** *(Day 85–115)*, when most of the fetal and mammary growth occur, there is a significant increase in the nutritional needs of the sow and it is common to increase feed allocation by 0.5 kg/day or more, depending on the body condition of the sow and the environmental conditions.

Feeding During Lactation

- **The goal of feeding in lactation is to;**

✓ **Minimize weight loss (less than 15kg in 35 days)**

✓ **Increase piglet growth rate through increased milk production**

✓ **Decrease piglet mortality**

✓ **Ensure re-breeding and subsequent reproductive performance.**

Day after farrowing	Total amount of feed (kg)
0	1.5
1	2
2	2.5
3	3
4	3.5
5	3.5
6	4

- Day 7 after farrowing
- Increase frequency of feedings to three times per day
- Feed sows as much as they will eat according to the table below

More than 0.5kg remains	Most feed gone	Feeder empty
Reduce feeding by 0.5kg.	Feed same amount	Increase by 0.5 – 1kg.

Factors Influencing Lactation Feed Intake

- **Environment**

Ambient temperature

Air velocity

Evaporative cooling

Humidity

Ventilation rates

- **Facilities equipment**

Water flow

Feeder design

Automated vs. hand feeding

Floor surface

Crate design

- **Gestation feed intake**

Body condition at farrowing

- **Sow factors**

Lactation length

Litter size

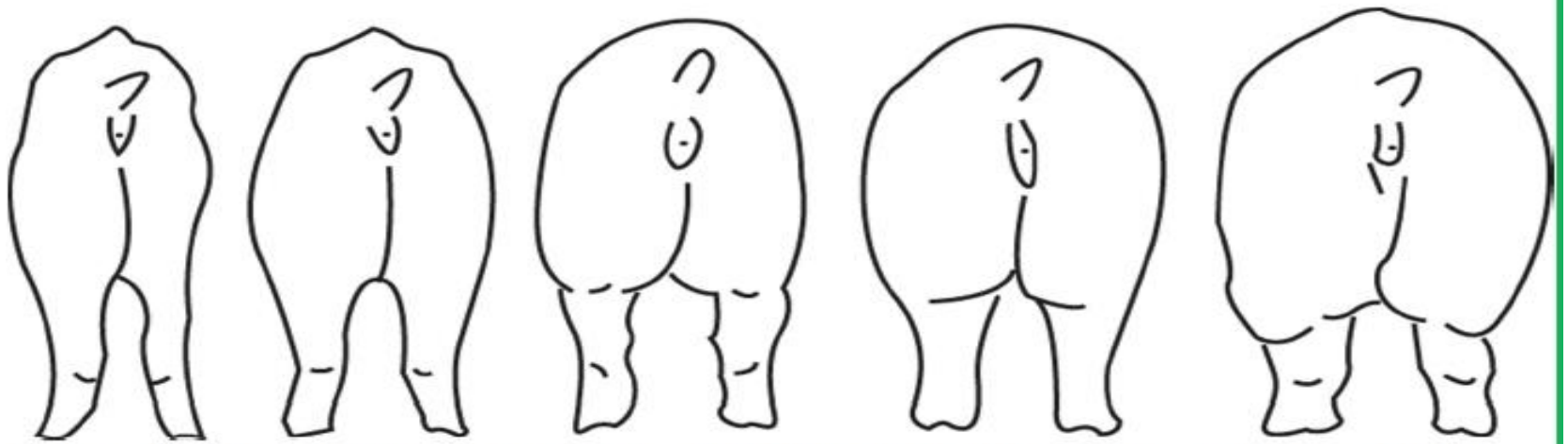
Genetics

Parity

Disease

Feeding The Weaned Sow

- Feeding management of the weaned sow focuses on starting the recovery of body reserves lost during lactation and supporting ovulation rate to ensure a large subsequent litter size.
- Nutrition and feeding during the wean-to-estrus interval cannot fix prior issues such as over condition in gestation and poor lactation intake.
- Only provide feed ad libitum for sows with a body condition score reading of thin.
- Do not skip a meal (think about the practical implications on wean day).
- Group sows by body condition.
- Ensure feed is fresh to minimize waste and spoilage



Body Condition Scores (BCS). Scores are arranged from 1 (left) which is assigned to emaciated sows to 5 (right) which is reserved for excessively fat sows. A score of 3 is ideal.

Taken from "Assessing Sow Body Condition" by R.D. Conffey, G.R. Parker, and K.M. Laurent (ASC-158); 1999).

BCS Score 1 **BCS Score 2** **BCS Score 3** **BCS Score 4** **BCS Score 5**

Photo credit: Dr. Ken Stalder and the National Hog Farmer magazine

Score	Last rib backfat depth (in.)	Condition	Body Shape
1	<.6	Emaciated	Hips, spine prominent to the eye
2	.6 - .7	Thin	Hips, spine easily felt without pressure
3	.7 - .8	Ideal	Hips, spine felt only with firm pressure
4	.8 - .9	Fat	Hips, spine cannot be felt
5	>.9	Overfat	Hips, spine heavily covered

Feeding During the Growing Phase

Nursery Pig

- The nursery nutrition program focuses on maximizing feed intake in the first week after weaning, preferably utilizing highly digestible diets. The goal is to transition pigs to simpler diets as quickly as possible.
- Age at weaning and high feed intake after weaning are critical to maximize performance in the nursery phase.
- specially formulated for their unique digestion systems and growing stages. These foods should contain high-quality protein, essential vitamins and minerals, and digestible carbohydrates to support healthy growth and immunity
- Based on the development of weaned piglets' digestive system, 2 - 3 diets are typically fed during the nursery period. The feeding duration of each phase will vary according to weaning age
- Meeting the AA /protein requirement especially in the last phase of the nursery crititical since this represents the greatest portion of nursery growth.
- The nursery feeding program corresponds to approximately 10 to 15% of the total feed cost to produce a pig.

Grow-Finish Pig

- The goal for grow-finish diets is to maximize return on investment.
- The most cost-effective energy, protein and phosphorus levels available.
- Proactively act on strategies to increase market weight for high profitability

Feed cost per animal entity as a percentage of total feed cost

Animal Entity	Feed Cost %
Sows	17.5
Boars	-
Piglet creep feed: day 10 – 28	1.2
Piglet creep feed: day 28 – 42	4.1
Piglet creep feed: day 42 – 56	5.4
Piglet creep feed: day 56 – 70	7.3
Porker stage	34.7
Baconer stage	28.8
Replacement gilts	1.0
TOTAL	**100**

Types Of Water Access

Feeder Requirements

- Feeder space is an important factor
- Pigs are normally social eaters
- If 1 eats they all eat (look at piglets suckling on the mother)
- Most Kenyan feeding systems continue this trend as pigs are often trough fed
- For best efficiency of feeding growing pigs ad-libitum feeders

Feeder Requirements

- Trough Feeding recommendations

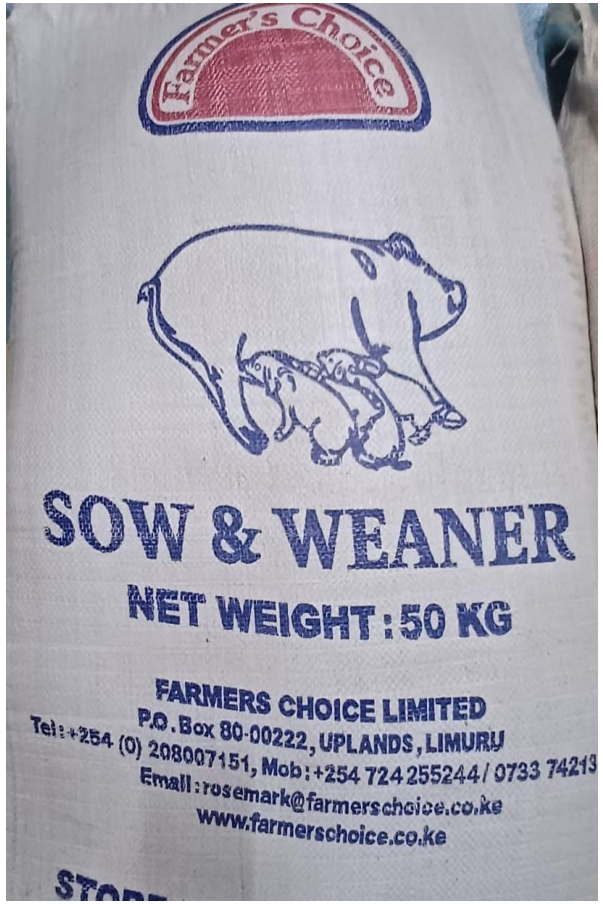
Weight of pig (kg)	Trough/hopper length (mm)/pig	
	Restrict fed	*ad lib* fed
5	100	75
10	130	33
15	150	38
35	200	50
60	240	60
90	280	70
120	300	75
Sow	400	n/a

CONCLUSION

- Each production/growing phase requires specific nutrients to produce optimally
- Important nutrients;
  - Energy (DE/NE)
  - Amino acids
  - Fibre
  - Fats
  - Ca:P
  - Minerals and Vitamin
- Diets
  - Prestarter/creep
  - Starter
  - Grower
  - Finisher
  - Gestation
  - Lactation

AGE IN WEEKS	AGE IN DAYS	FEED LEVEL/ PIG IN KG		TYPE OF FEED		
			AM		MID	PM
	16	AD LIB	SUPER CREEP			
4	28	AD LIB	SUPER CREEP			
5	35	AD LIB	SUPER CREEP			
6	42	0.7	SUPER CREEP		SUPER CREEP	SUPER CREEP
7	49	0.8	SUPER CREEP		STARTER	SUPER CREEP
8	56	0.9	STARTER		SUPER CREEP	STARTER
9	63	1.0	STARTER		STARTER	STARTER
10	70	1.2	STARTER		STARTER	STARTER
11	77	1.3	STARTER		GROWER	STARTER
12	84	1.5	GROWER		STARTER	GROWER
13	91	1.7	GROWER		GROWER	GROWER
14	98	1.9	GROWER		GROWER	GROWER
15	105	2.1	GROWER		GROWER	GROWER
16	112	2.3	GROWER		GROWER	GROWER
17	119	2.5	GROWER		GROWER	GROWER
18	126	2.7	GROWER		FINISHER	GROWER
19	133	2.8	FINISHER		GROWER	FINISHER
20	140	2.9	FINISHER		GROWER	FINISHER

OUR FEEDS


Farmer's Choice
SOW & WEANER
NET WEIGHT : 50 KG
FARMERS CHOICE LIMITED
P.O. Box 80-00222, UPLANDS, LIMURU
Tel : +254 (0) 208007151, Mob : +254 724 255244 / 0733 74213
Email : rosemark@farmerschoice.co.ke
www.farmerschoice.co.ke


Farmer's Choice
PIG FINISHER
NET WEIGHT : 50 KG
FARMERS CHOICE LIMITED
P.O. Box 80-00222, UPLANDS, LIMURU
Tel : +254 (0) 208007151, Mob : +254 724 255244 / 0733 742130
Email : rosemark@farmerschoice.co.ke
www.farmerschoice.co.ke


G STARTER MEAL
NET WEIGHT : 50 KG
FARMERS CHOICE LIMITED
P.O. Box 80-00222, UPLANDS, LIMURU
Email : rosemark@farmerschoice.co.ke
www.farmerschoice.co.ke


Farmer's Choice
PIG GROWER
NET WEIGHT : 50 KG
FARMERS CHOICE LIMITED
P.O. Box 80-00222, UPLANDS, LIMURU
Email : rosemark@farmerschoice.co.ke
www.farmerschoice.co.ke

Diet Specification Guidelines

Pig Category	Energy KCal	Crude Protein	Fat	Crude fiber	Calcium	Phosphorus
Weaner	2400 - 2600	18%	3%	3 – 4%	0.45%	0.30%
Grower - Finisher	2400 – 2500	14 – 16%	3%	4 -5%	0.4 – 0.5%	0.45%
Lactating Sow	2400 – 2600	14 – 16%	3 – 4%	3 -4%	0.4 – 0.6%	0.3 – 0.5%
Breeder/Gestating sow	2400 – 2500	16 – 18%	3 – 4%	3 – 4%	0.4 – 0.6%	0.4 – 0.5%

Farmer's Choice

Your Guarantee of Quality