



Feed Formulasi - Pabrik

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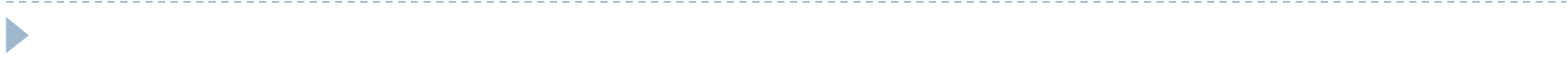
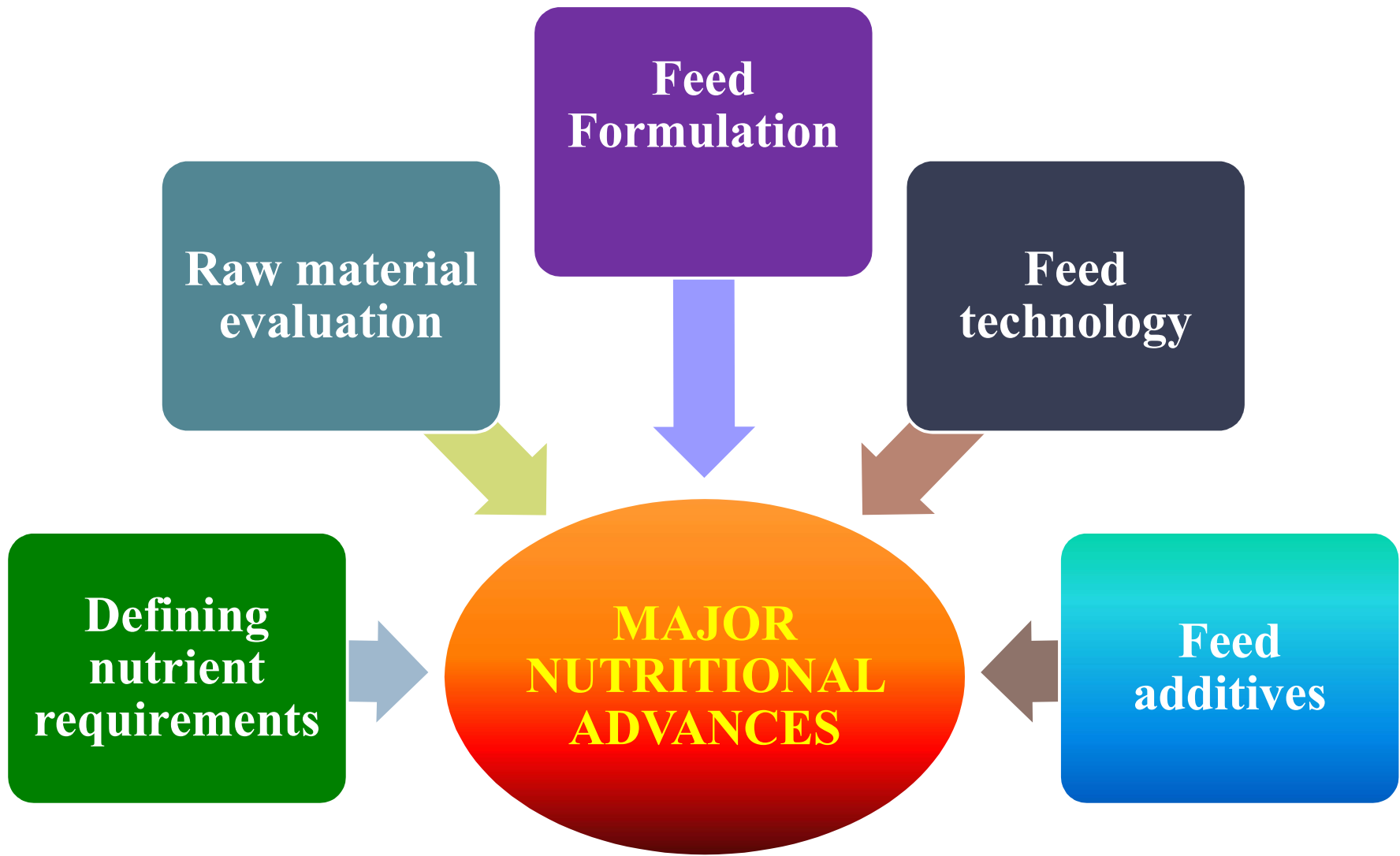
The relationship between feed quality and animal performance is important and encompasses not only the quantitative amounts of all feed components, but also the digestibility and metabolism of those components.



Feed Quality

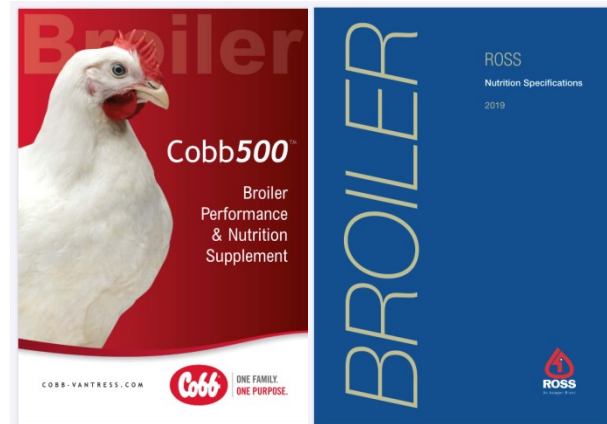
- ▶ Good quality of feed is influenced by:
 - Formulation
 - Good quality of the raw materials
 - Production process





Defining Nutrient Requirement

- ▶ Primary breeder recommendations.
 - Only starting point
 - Adequate not optimal
 - Single recommendation for all circumstances.
 - Not realistic.
- ▶ Prestarter, starter, grower, finisher, laying
- ▶ Female, male
- ▶ Climate
- ▶ etc



Nutrition Standard

- ▶ NRC (US), ARC (UK)
- ▶ University
- ▶ Commercial Industry (Novus, Evonik, etc)
- ▶ Association (ASA)
- ▶ Research



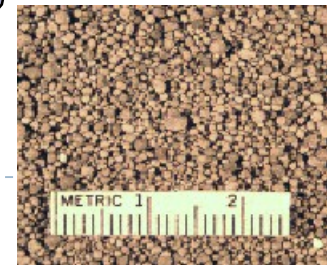
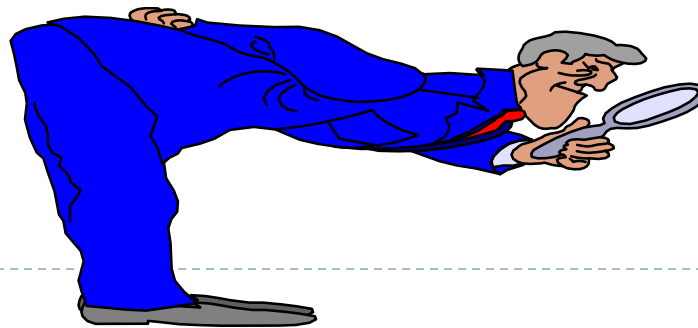
Ration Formula

- ▶ Animal nutrient requirement (depend on type, age, sex, weight, production, etc)
- ▶ Feed ingredient and composition
- ▶ Limitation of feedstuff usage
 - Nutrient content
 - Antinutrient content
- ▶ Ingredient price
 - Price in nutrient unit



Raw Material Evaluation

- ▶ Ingredient choice is based on the economic input of nutrients.
- ▶ Proximate analysis is best indication of nutrient levels including energy
- ▶ An understanding of particular advantages or problems of each ingredient is required to set minimum or maximum limits.
- ▶ Local conditions may affect your choice of ingredients.



Good Quality Raw Material

- ▶ The obstacles of getting the good quality raw materials:
 - The availability of the raw materials
limited sources → higher demands
 - Price fluctuation



Feedmill

- ▶ Purchase
- ▶ Production
- ▶ QC
- ▶ Laboratory
- ▶ Nutritionist

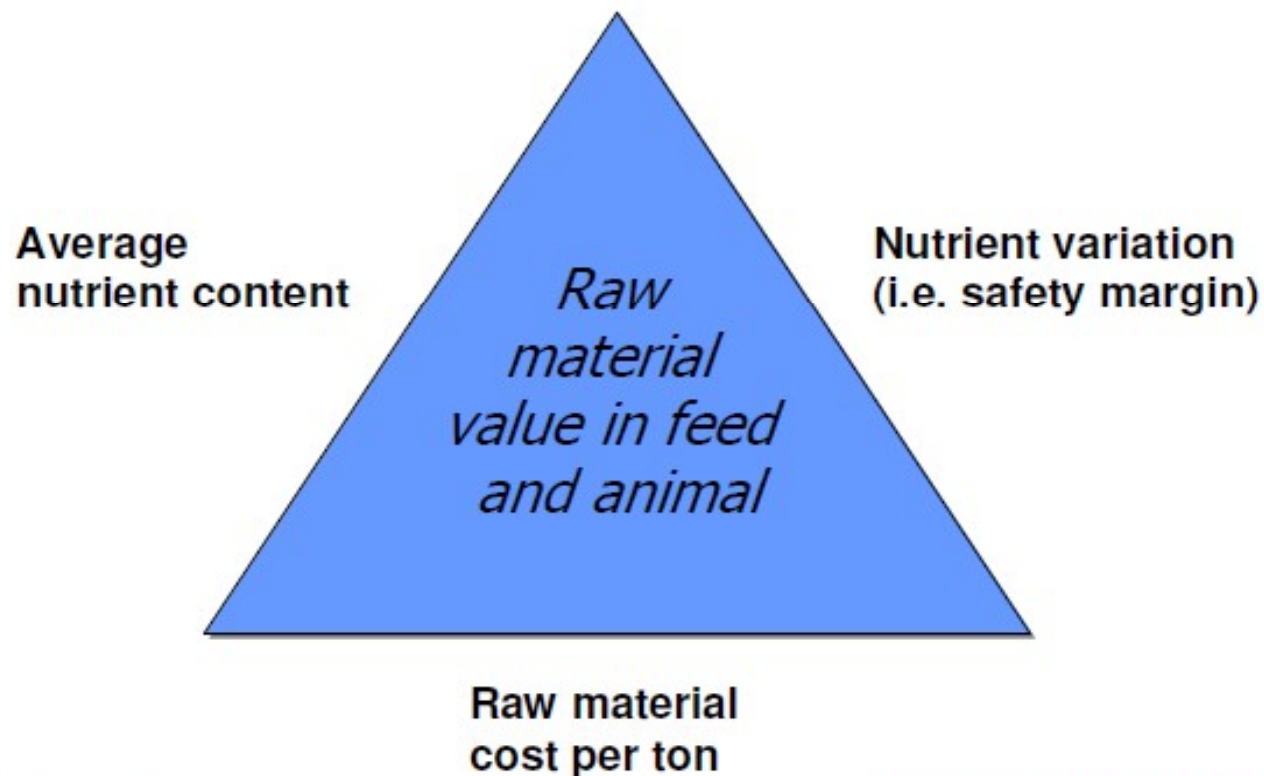


Quality Control (QC)

- ▶ Determining quality of incoming ingredients and outgoing feed
- ▶ Ensuring and controlling all process is going well
- ▶ Ensuring that specification formula is correct, ex. data from formulator, feed code, availability of raw material, etc.



The value of raw materials in feed formulation is defined by 3 main factors



Raw Materials

○ Corn



○ Soybean seed



○ Rice bran



○ Rapeseed meal



○ Corn gluten meal



○ Soybean meal



Raw Materials

○ Meat bone meal



○ Chicken feather meal



Crude Palm Oil (CPO)



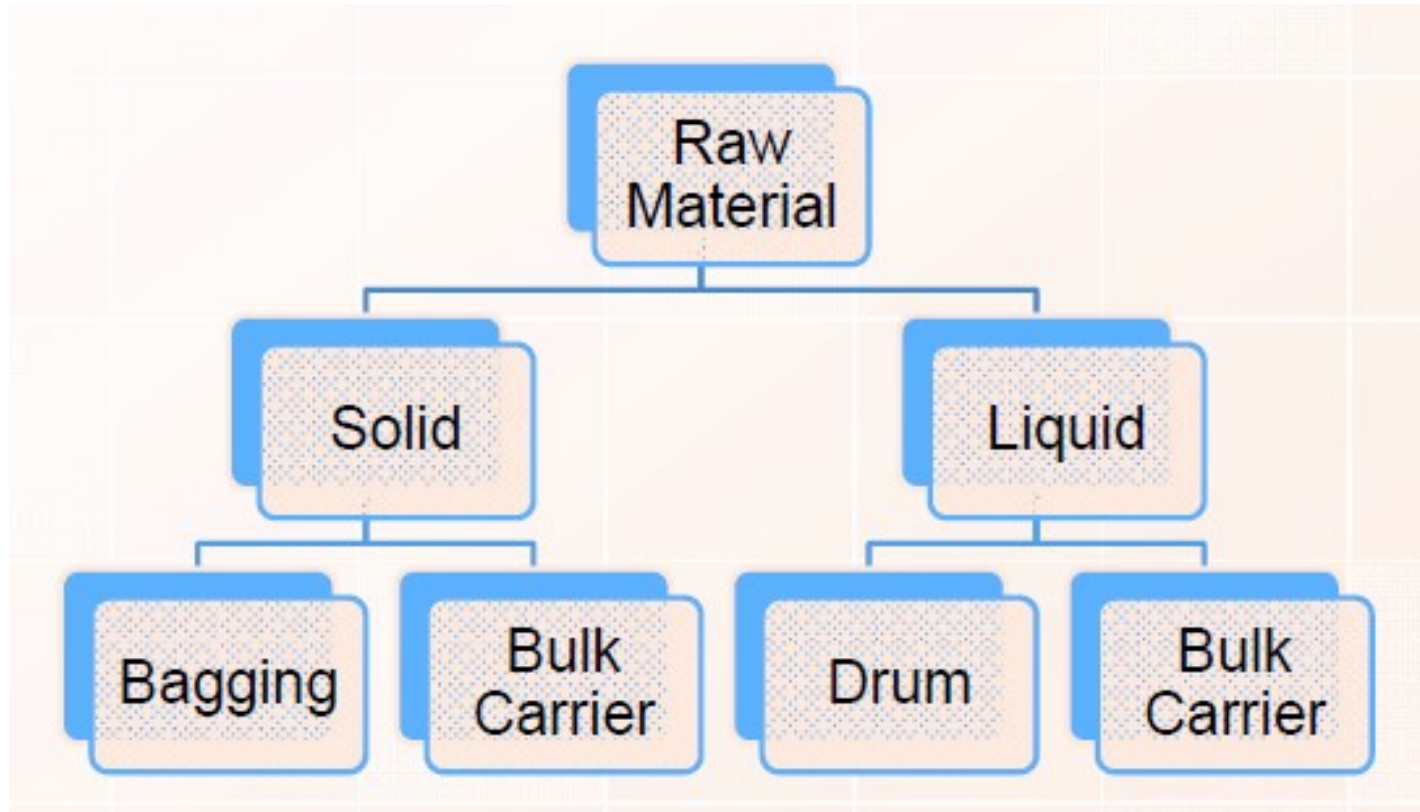
Garam



Limestone



Raw Material Packaging

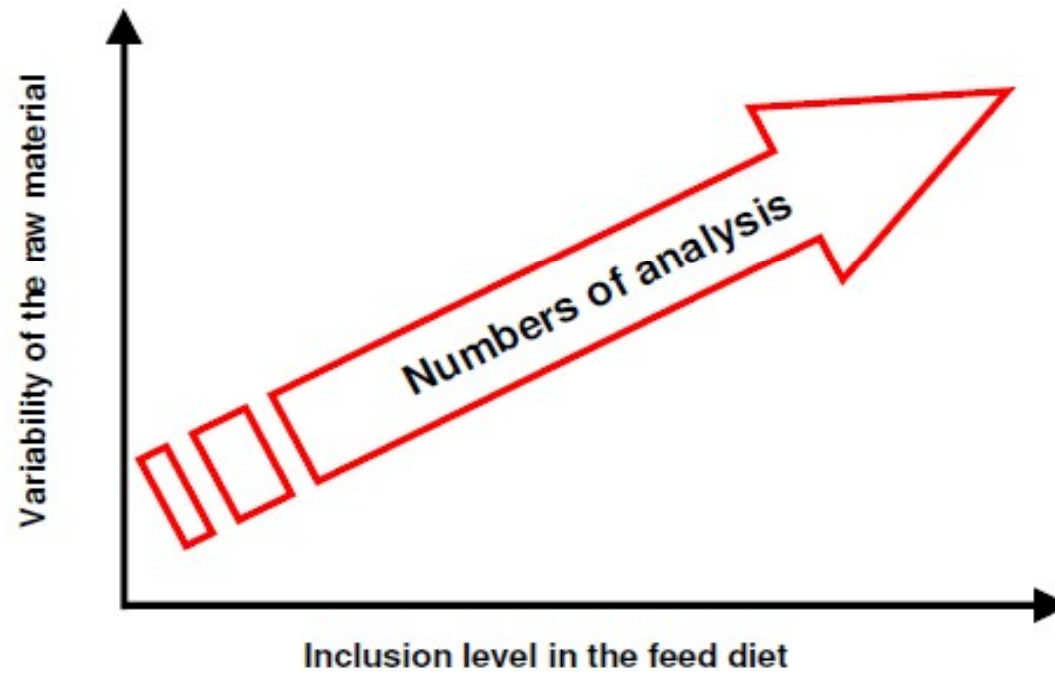


Sampling

- ▶ Sampling decision is important. Sampling must be representative of raw materials coming. Because sample must be representative of the whole of raw material coming, so we have to:
 - Ensuring take a good sample
 - Taking sample must be random
 - Following the standard of sampling



Nutrient variation in feed - Which raw materials are critical and should be sampled?



Raw Material Sampling Handling



Raw material evaluation is only as good as the weakest link of the process chain



Sampling and Analysis

Statistical evaluation

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Taking action

Do

Systematically, over defined period, e.g. via NIRS

Evaluate aggregated data per country or supplier and compare nutrient content means and variation

Communicate results to those who can take action:

- Purchasing
- Quality control
- Nutrition/formulation
- Feed mill

Don't

Spot sampling

Look at analytical results of individual samples in isolation

Keep analytical results in the QC lab



NIRS

Near Infrared Spectrophotometer (NIRS) is a spectroscopic method that uses the near-infrared region of the electromagnetic spectrum (800 – 2500 nm).

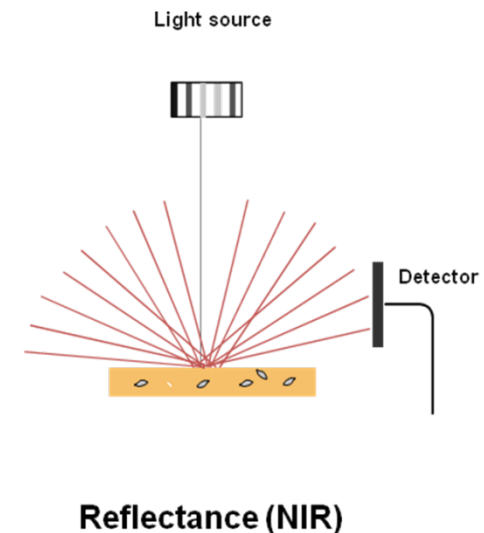
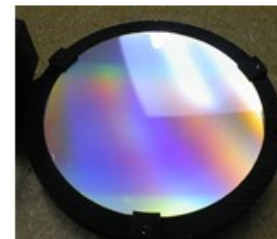


NIRS is Nothings without Equation

Spectra \leftrightarrow Reference data



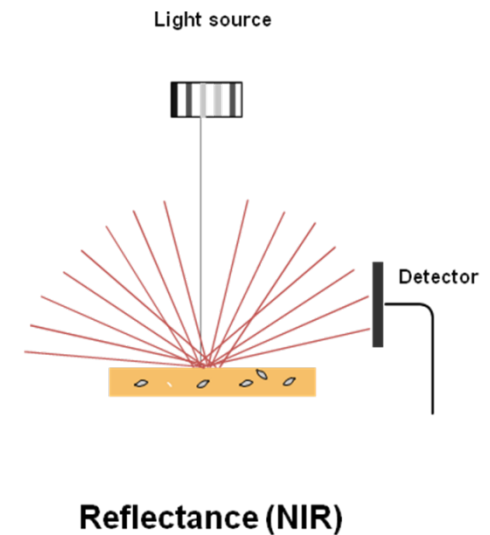
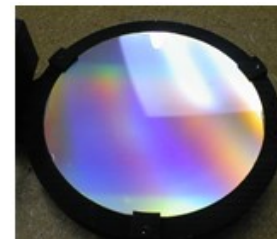
Calibration Model (equation)



NIRS

NIR only used from the ingredients who have Hydrogen bonds : CO, OH, NH

- Moisture
- Ash
- Crude Protein
- Ether Extract /Fat
- Fiber
- Energy
- FFA
- Amino Acid
- Ca + P



Adulteration



Rice bran



Meat bone meal



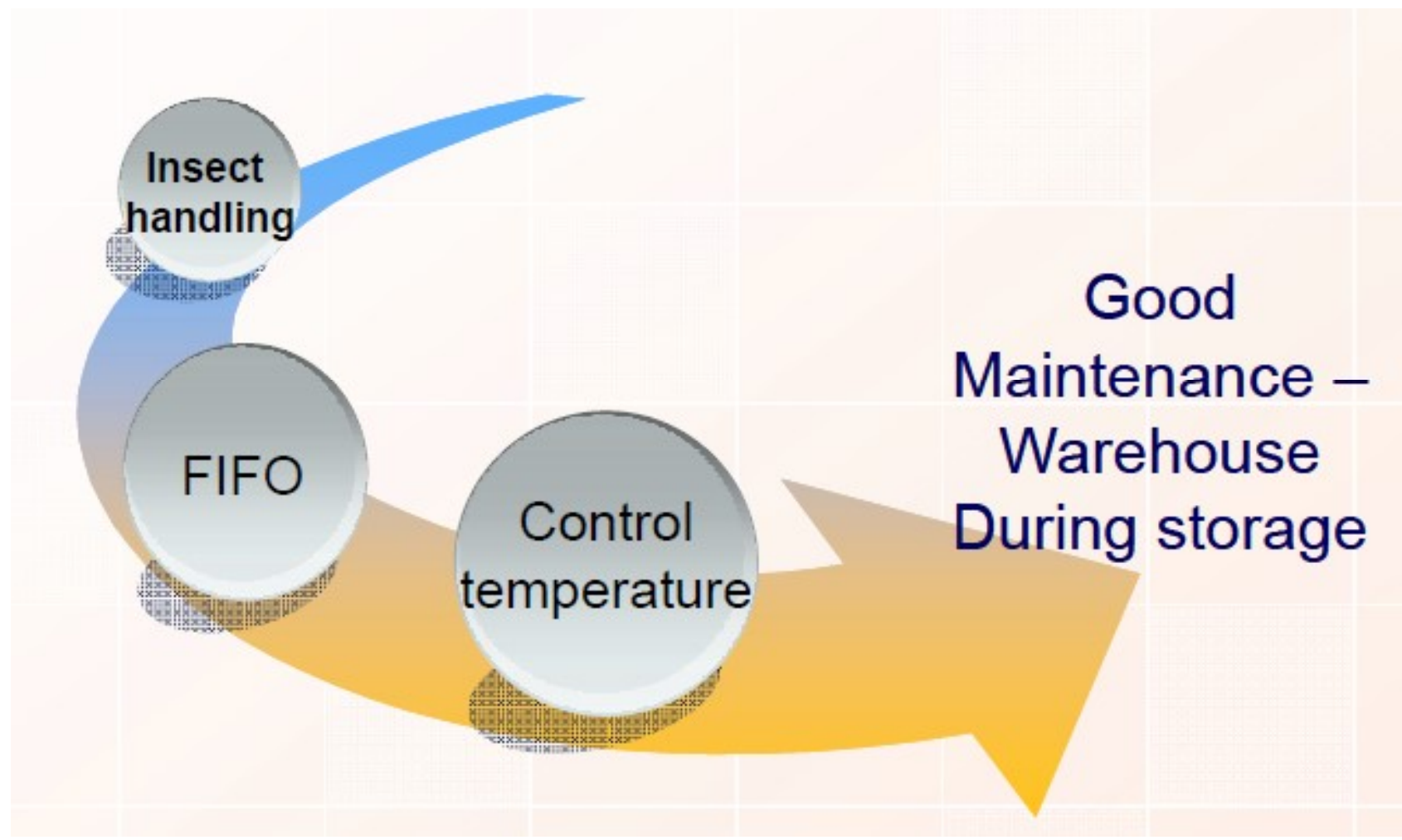
Antinutrient Content

Antinutritional factors are substances that when present in animal feed reduce the availability of one or more nutrients. It is important to have knowledge of antinutritional factors because they can adversely affect the health of poultry.

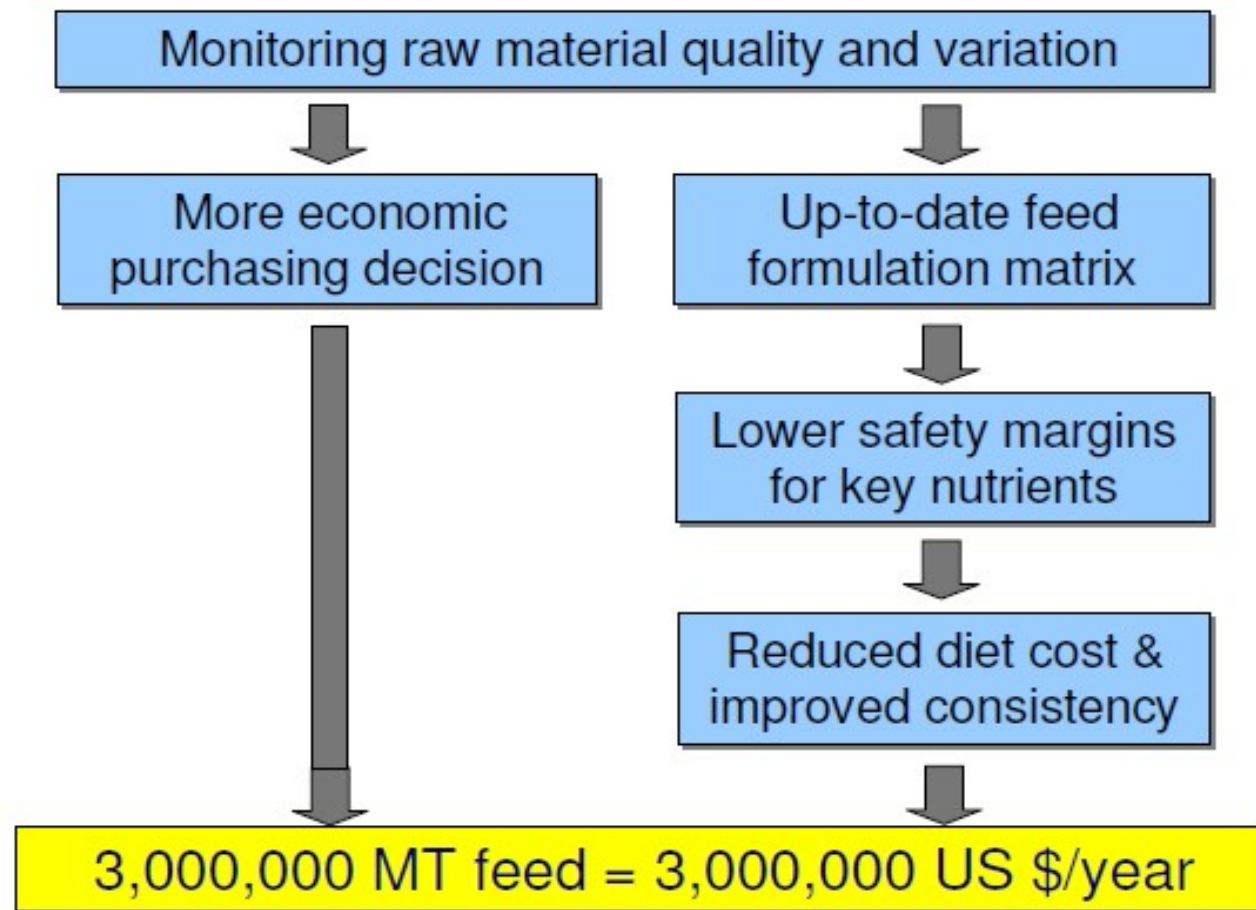
Name	Source
Mycotoxin: Aflatoxin, DON, T-2, Zearalenone, Fumonisin	Corn, moldy RM Test by Wet chemist – primary test or UV as a secondary test
Trypsin inhibitor → Urease activity	Full fat



Raw Material Handling



Monitoring raw material quality is key to optimum profitability



Type of Formulation

▶ **Maximum-nutrient formulation**

- Definition: A feed formula that most closely meets the animal's nutrient requirements, regardless of cost

▶ **Lowest-expense formulation**

- Definition: A feed formula that is the least expensive to purchase and disregards the animal's nutrient requirements

▶ **Least-cost formulation**

- Definition: A feed formula that, within limits, satisfies an animal's nutrient requirements with minimal ingredient costs
- Most commonly-used formulation scheme
- Primarily accomplished with aid of computer programs (Brill)

Fox, 1998



Least-Cost Formulation Requirements

- ▶ Ingredient Cost (many websites)
- ▶ Ingredient Nutrient Composition (supplier)
- ▶ Animal Nutrient Requirements (NRC)
- ▶ Ingredient Nutrient Availability (NRC)
- ▶ QC database



Common Least-Cost Formulation Constraints

- ▶ **Meet nutrient requirements (minimum)**
 - Energy
 - Crude protein or amino acid
 - Vitamins and minerals
- ▶ **Minimize excreted nutrients**
 - Phosphorus
 - Selenium, copper, and other microminerals
- ▶ **Meet dry matter intake (max light density)**
- ▶ **Maximize carcass fat quality (max added fat)**
- ▶ **Simplify feed manufacturing**



Nutrients and Formulation

- ▶ Use meaningful nutrients:
 - digestible amino acids, energy systems
 - what Phosphorus system you are working with ?
- ▶ All data must be in the same units:
 - g/kg and not%; ppm and not g/kg
- ▶ Data must be on the same scale
 - do not mix energy systems
 - do not mix total and available nutrient values



Potential Feed Safety Hazards

- ▶ Physical Hazards
- ▶ Chemical Hazards
- ▶ Microbial Hazards

- ▶ Incorrect animal nutrient requirements
- ▶ Incorrect ingredient loading values
- ▶ Miscalculations
- ▶ Miscommunications



Feed Formulation Program

- ▶ Need computer
- ▶ Mixit, Spartan, FeedMania, UFFDA, WinFeed, FeedLive, Bestmix, Feedsoft, Brill, etc



WinFeed

- Developed by University of Cambridge UK
- Usefull for ruminants, poultry, pets, fish, etc.
- Simple and user friendly
- Compatible fo Window 98, 2000, XP, Vista
- www.winfeed.com



FeedLive

- Developed by Feed Live Informatics Company, Nothaburi, Thailand
- Usefull for monogastric and ruminant animals
- Simple and user friendly
- Compatible fo Window 98, 2000, XP.
- www.feedliveinformatics.com



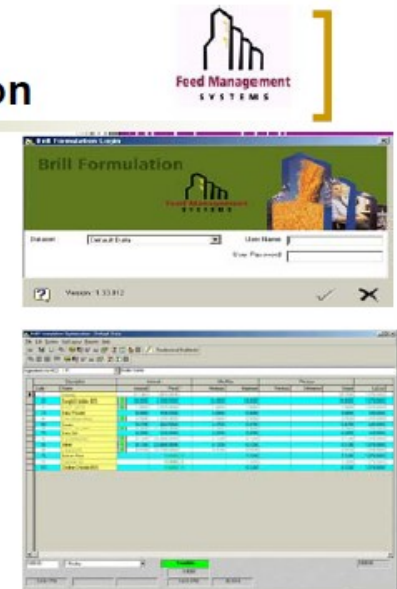
Feedsoft

- Developed by Feedsoft Corporation, USA
- Usefull for monogastric and ruminant animals
- Supports for client and plants
- Support multi blending
- Compatible fo Window 98, 2000, XP.
- www.feedsoft.com

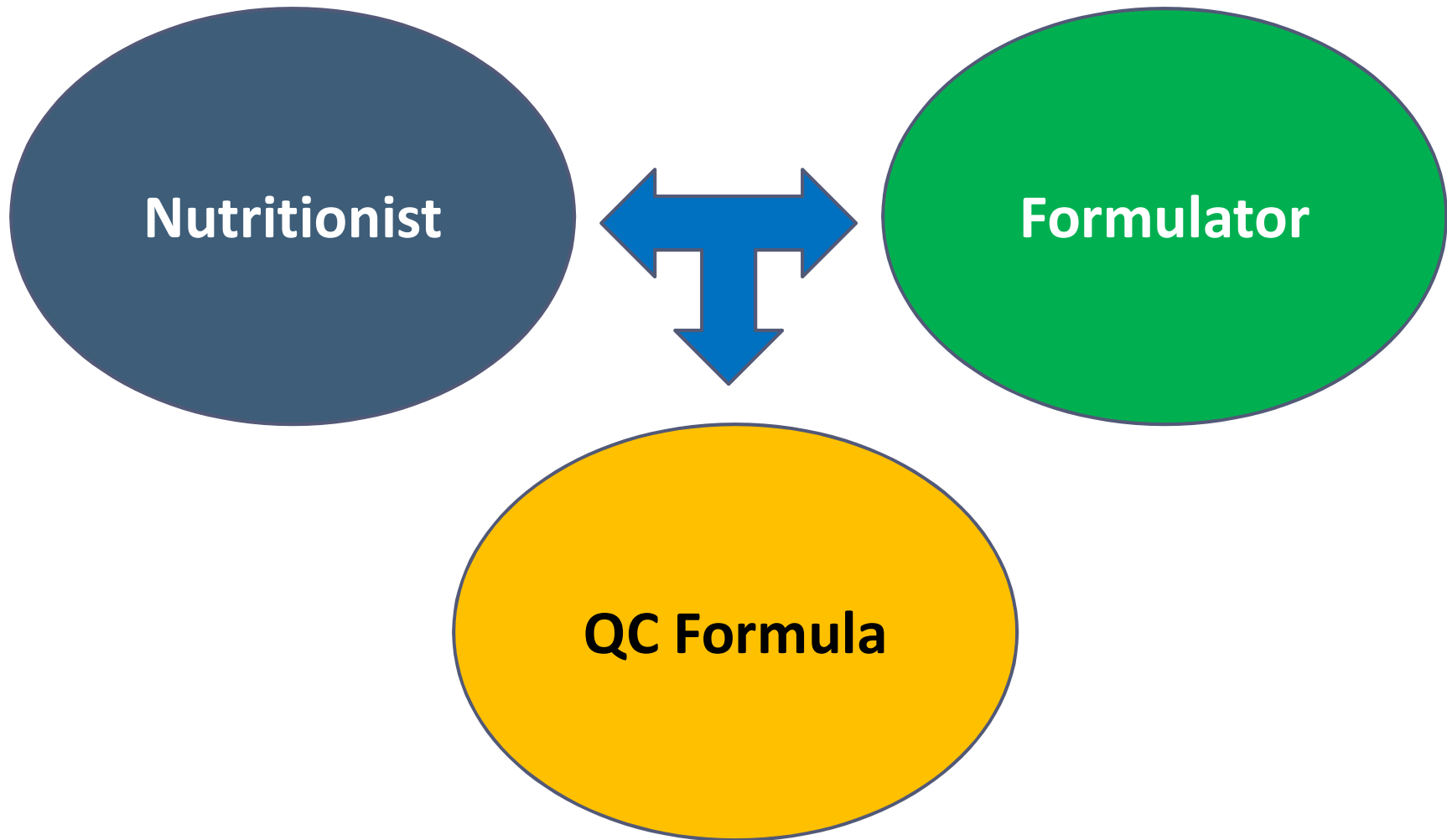


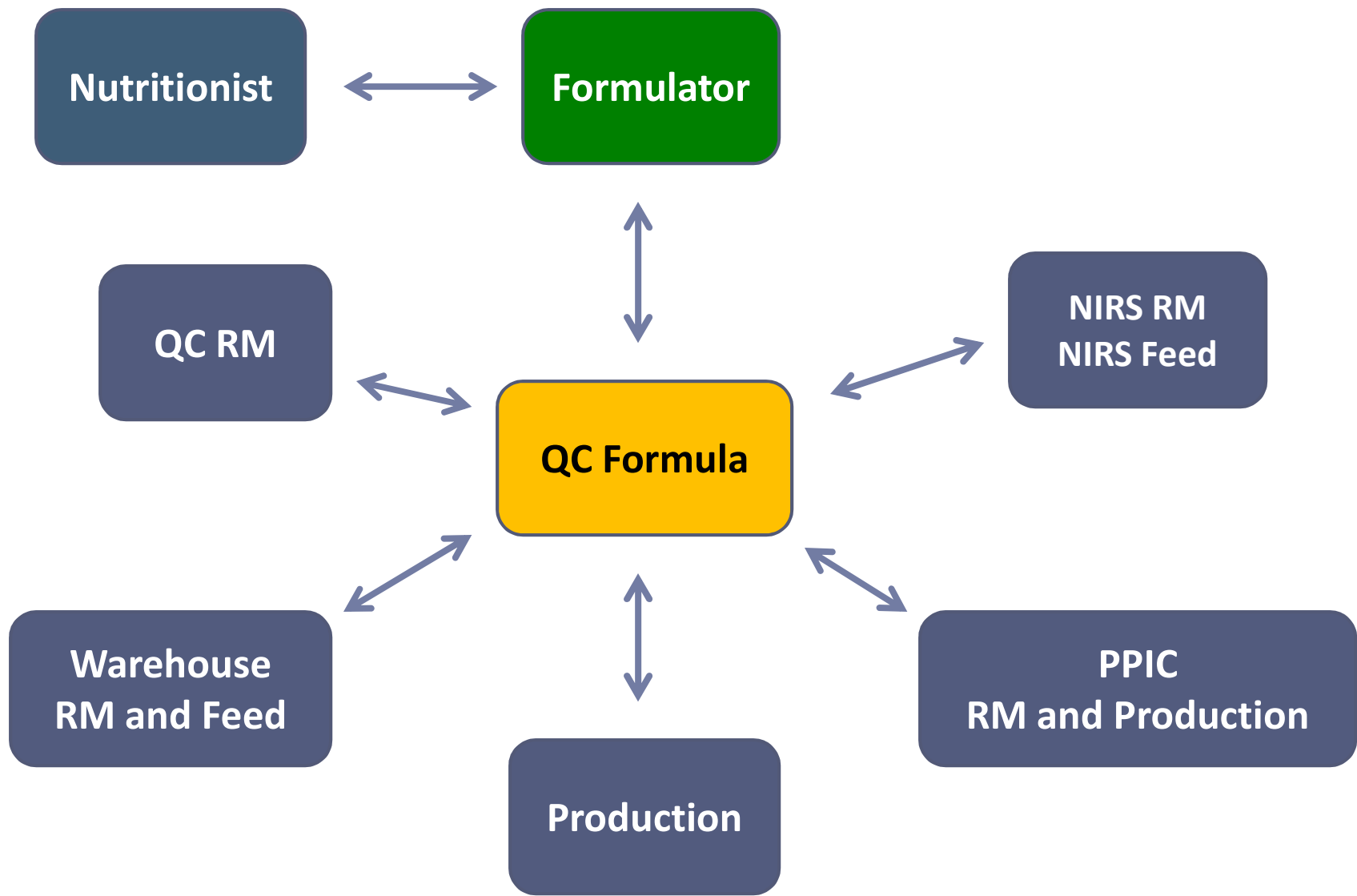
Brill Feed Formulation

- Developed by Feed Management System Inc, USA.
- Advance feed formulation software
- Usefull for monogastric and ruminants
- Minimize cost of a formula, multiple formulas in multiple feedmills (multi blending)
- Compatible fo MS Window
- www.feedsys.com



Feed Formula – Daily Activity





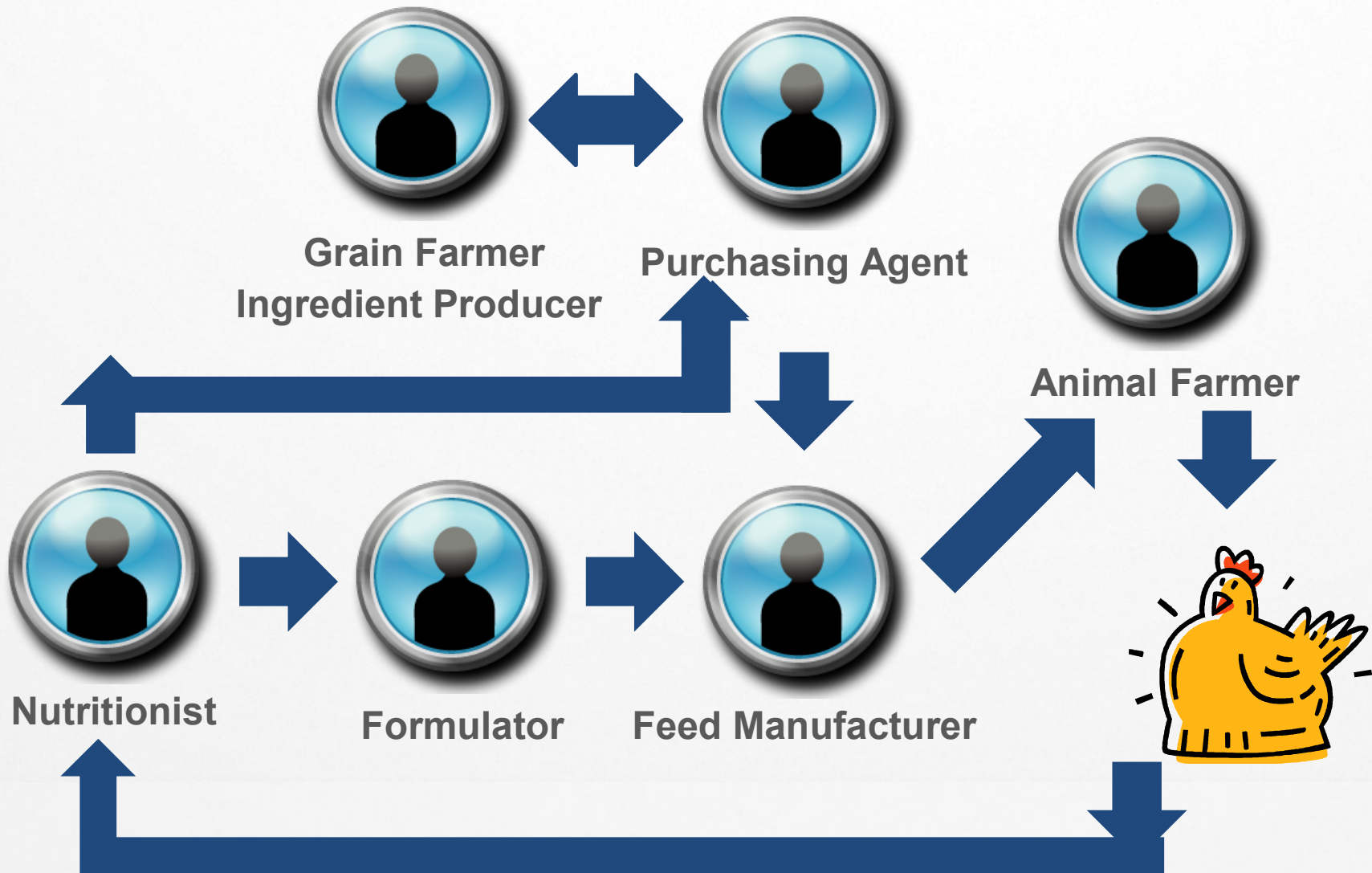
QC Formula

The job desk of QC formula is to control formula :

1. Demand of raw materials available
2. According to the spec for formulator
3. Check the code of every plan formula is correct or not
4. Check the existing material
5. Check the quantity of material
6. Check every formula must be have premix
7. Review the new formula
8. Coordination and checked with production



Individuals Involved in Diets



Summary

- ▶ Numerous responsible for feed formulation, but animal is most important.
- ▶ Ingredient inclusion levels depend on species or production phase of the animal.
- ▶ Diets are normally formulated on a least-cost basis with constraints for nutrient requirements, nutrient excretion, dry matter intake, carcass quality, and feed manufacturing.
- ▶ QC Responsibility



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