FUDAMENTAL OF POULTRY NUTRITION

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INTRODUCTION

- Poultry production basically depends on two factors:
- 1. MANAGEMENT- Housing,rearing & prevention of diseases
- 2. NUTRITION- Judicious management of feed quality, as 70% of production cost belongs to feed

BASIC TERMINOLOGY RELATED TO POULTRY NUTRITION

- POULTRY: The term "Poultry" includes birds reared for economic gain like chicken, ducks, emus, quails, turkeys etc.
- Nutrition: It is defined as "Series of process by which an organism takes in & assimilates feed for promoting growth and replacing worn or injured tissue"
- Nutrient: The chemical substances found in feed materials are necessary for maintenance,production &health of animals.

TERMINOLOGY

- **Feed:** Any naturally occurring ingredient or material fed to animals for the purpose of sustaining growth & development. The term "Food" used in case of human.
- **Ration:** A fixed amount of feed for one animal fed for a definite period usually for a 24 hours period.

CLASSES OF NUTRIENTS

I. Carbohydrate – 20 nos.
II. Fatty acids - 15
III. Amino acids - 20
IV. Minerals - 25 , Essential-15, Probably essential -10
V. Vitamins
VI. Water
VII. Additives- may be nutritive or non-nutritive

FEED INGREDIENTS USED IN POULTRY RATION

A. Energy sources:

Cereal grains- Maize, Rice, Bajra,Wheat etc.

Oils - Veg. oil- rice bran oil, soya oil, palm oil

Animal fat- Tallow, Lard & Fish oil.

B. Protein sources:

Veg.origin- Different oil cakes- Til cake, MOC,Sun flower cake, soyabean meal

Animal origin-Fish meal, meat meal, meat cum bone meal.

C. By Products: DORB, Rice polish, Brewer's yeast

FEED INGREDIENTS

MAIZE GRAIN

MAIZE WITH COB

FEED INGREDIENTS

BAJRA

BAJRA WITH COB

SOYABEAN MEAL

GROUND NUT CAKE

DRY FISH

MEAT CUM BONE MEAL

MAXIMUM INCLUSION LEVEL OF FEED INGREDIERNTS IN POULTRY RATION

Ingredients	Max. inclusion level(%)	Ingredients	Max. inclusion level(%)
Maize	70	Rice oil	8
Wheat	60	Palm oil	6
Bajra	50	Fish oil	5
Broken rice	30	Tallow	5
Soyabean meal	40	DCP	3
Til cake	15	LSP	10
MOC	10	Shell grit	15
GNC	25	Salt	0.6

Nutritive value of some common feed ingredients for poultry

Ingredient	ME(kcal/kg)	CP(%)	CF(%)	Ca(%)	AP(%)	Lysine(%)	Meth(%)
Maize	3300	8.5	3.5	0.05	0.10	0.21	0.18
Wheat	3100	8.0	5.0	0.10	0.15	0.22	0.16
Bajra	3000	7.5	6.0	0.10	0.15	0.20	0.18
Rice	2800	7.0	1.0	0.08	0.15	0.18	0.14
DORB	1600	13.0	16.0	0.15	0.30	0.35	0.25
MOC	2000	35	14.0	0.40	0.70	1.20	0.70
Til cake	2000	28	15.0	0.30	0.65	1.00	0.75
GNC	2200	42	12.0	0.35	0.60	2.54	0.56
Soybean	2400	46	6.0	0.30	0.30	2.83	0.63
Fish	2000	50	-	8.0	4.5	4.5	1.50
MBM	2100	50	-	12.0	8.5	3.34	1.23
Rice oil	8500	-	-	-	-	-	-

FEEDING OF CHICKEN

- The following information is needed for feed formulation:
- 1. NUTRIENT requirement of chicken feed and
- 2. INFORMATION on feed ingredients

NUTRIENT REQUIREMENT OF CHICKEN

Characteristics	Broiler Starter	Broiler Finisher	Chick feed	Grower feed	Layer feed	Breeder feed
ME(kcal/kg)	2800	2900	2800	2500	2600	2600
CP(%)	23	20	21	16	18	16
CF(%)	5	6	6	8	8	8
AIA(%)	3	4	3	4	4	4
Ca(%)	1.2	1.2	1.0	1.0	3	3
AP(%)	0.50	0.5	0.50	0.40	0.45	0.45
Lysine(%)	1.20	1.0	1.10	0.70	0.70	0.80
Methionione(%)	0.50	0.40	0.45	0.30	0.40	0.40
Cu(ppm)	20	20	20	15	15	20

CALORIE AND PROTEIN RATIO

- ✓ Broiler Starter : 122
- ✓ Broiler Finisher:145
- ✓ Layer chicks: 133
- ✓ Grower : 156
- ✓ Layer : 144
- ✓ Breeder 162 Accordingly feed formulation and intake may be modified.

INFORMATION OF FEED INGREDIENTS

1. ENERGY: Cereal grains, byproducts and oils
2. PROTEIN: Vegetable and Animal origin
3. MAJOR MINERALS: Ca from DCP, LSP & Oyster shell
4. P from DCP, MCP & bone meal
5. TRACE MINERALS: Various salts of trace minerals, viz: Cu- from $CuSO_4$, Zn- from $ZnSO_4$, Mn- from $MnSO_4$, I- from KI, and Se- from Na_2Seo_3.

FEED INGREDIENTS

- 5. AMINO ACIDS- naturally from feed sources and synthetic like L- Lysine & DL-Methionine
- 6. VITAMINS: Feed grade are available from diff. manufacturers like AB2D3K and B-Complex as well as liquid form is also available
- Vits are used as per specification and as when required.

FEED ADDITIVES

- ACIDIFIER: Na -byturate, Ca –propionate,
- ANTIBIOTICS: CTC, BMD, Furazolidone etc.
- ANTI-OXIDANT: BHA, BHT, Vit E
- ANTICOCCIDIAL: Diclazuril,Maduramycin,DOT
- TOXIN BINDER: Various organic acids and Oligo-saccharides.

COMMON ADULTERANTS IN FEED INGREDIENTS

1. MAIZE: Moisture (high),
2. SOYA :Urea, DORB
3. TIL CAKE/MOC: Silica
4. FISH MEAL : Silica and salt
5. MEAT MEAL : Leather and frog meal
6. DCP : LSP and Salt

CRITERIA FOR PURCHASING POULTRY FEED INGREDIENTS

- Maize – miosture <12%, free from fungal & insect infestation
- Soyabean - miosture <11%, does not contain urea or DORB
- Til cake- protein -28%(min.), silica <8-10%
- MOC- protein -35%(min.), silica <8-10%
- Fish meal – salt<2%, silica<5%
- Meat meal - protein -50%(min.), Ca-10%, AP-6%

ESSENTIAL AMINO ACIDS FOR POULTRY

- ESSENTIAL- 10 (histidine, iso-leucine,lycine, leucine, methionine, arginine, phenyl-allanine, tryptophan,threonine, valine)
- SEMI-ESSENTIAL – 2 (cysteine & tyrosine)
- NON-ESSENTIAL – glycine (requirement is high, it is needed for biosynthesis of uric acid- the end product of protein metabolism)

FATE OF EXCESS AMINO ACIDS

- ✓ Methionine have growth depressing effect if added @0.4% in the ration
- ✓ Excess threonine decreases the growth of broiler (can be reduced by adding glycine)
- ✓ Toxicity of lysine can be overcome by addition of arginine

In Practical feeding when several feed ingredients are used moderate or excex are generally ignored.

FACTORS AFFECTING AMINO ACIDS REQUIREMENT

- Energy content of the diet
- Content of PUFA
- Presence of certain antibiotics
- Anticoccidials- Lasalocid increases the S-containing amino acids by 0.1%
- Excess level of one or more amino acids will increase the requirement of others.

PROTEIN & ENERGY REQUIREMENT PER DAY

Type	Broiler (growth-100 g/day)	Layer (production >90%)	Breeder (production 80% and above)
PROTEIN (g)	30	18	26
METABOLIZABLE ENERGY (kcal)	450	300	400

FEEDING MANAGEMENT

- BROILER- Mainly in deep litter , rarely in cages (experiment purpose only) having better FCR & growth.
- LAYER – Deep litter & cages, deep litter system requires 5% more feed than deep litter.
- BREEDER – Same as layer, more hatchable eggs from cages.

ADVANTAGES OF CAGE REARING

- ✓ Require less man power for operation.
- ✓ Require less feed
- ✓ Better performances in term of egg production
- ✓ Minimize microbial load
- ✓ Does not require any anti-coccidial in feed
- ✓ However, its initial investment is more but economic return is better than deep litter

TYPES OF FEEDING

- FULL FEEDING – in broiler and in layer or breeder up to 4 weeks or until standard body weight attained.
- RESTRICTED FEEDING – practiced in layer and breeder

Purpose: To attain standard body weight in each week

To get maximum uniformity in bird.

To obtain maximum productivity

TYPES OF FEEDING

- PHASE FEEDING – practiced both in layer and breeder that depends upon:
  - production percentage
  - egg size
  - age of the bird
- Nutrotional manipulation:
- Decrease protein %
- Decrease P %
- Decrease methionine%
- Increase Ca %
- Decrease ME (only in commercial layer)

PHYSICAL FORM OF DIET

- MASH – feeding all types of birds.
- CRUMBLES- feeding during pre-starter & starter period
- PELLET – feeding during finisher phase of broiler and laying birds

ADVANTAGES OF PELLET FEEDING

- ✓Less wastage of feed
- ✓Nutrients are uniformly distributed
- ✓No chance of selective feeding
- ✓Better growth and production
- ✓Decrease microbial load in feed

FEEDING STATEGY DURING HOT WEATHER

- BROILER :

✓ Increase energy content in the diet

✓ Add extra (20%) vitamins & minerals

✓ Add electrolyte in feed and water

✓ Do not practice feeding during peak temp.

✓ Frequent feeding with a gap of 2 hrs

FEEDING STATEGY DURING HOT WEATHER

- BREEDER & LAYER :

✓ Increase energy content in the diet

✓Add extra (20%) vitamins & minerals

✓Add electrolyte in feed and water

✓Increase Ca in the diet

✓Add more choline chloride in the diet

✓Feed the birds early in the morning.

FEEDING OF POULTRY FOR SKIN COLOUR & EGG YOLK COLOUR

- Yellow colour of broiler skin & egg yolk due to presence of Xanthophylls pigment in diet
- Xanthophylls present in yellow maize & alfalfa meal.
- Required amount 11- 66 mg/kg diet
- Must fed 3 weeks before for desired colour

HUMAN HEALTH & CHICKEN MEAT

- Chicken have the ability to convert the dietary nutrients to its own body composition
- PUFA- specially ***w-3*** fatty acid is good for human health
- Addition of rice bran oil & soya oil (rich in ***w-3*** fatty acid), to some extent fish oil in broiler diet helpful to produce ***w-3*** rich fatty acid meat

DESIGNER EGGS/BRANDED EGGS

- Addition of w-3 & w-6 fatty acids in layer diet
- Adding more Se (organic) in the diet
- Adding more vit. A & E
- Have better market value
- Specially designed for heart patient

FERTILE Vs NONFERTILE EGGS

- There is no specific proof that fertile eggs are more nutritious
- Except developing embryo in fertile eggs provide more nutrients
- Fertile eggs are more expensive to produce
- Fertile eggs deteriorate more rapidly than do non fertile eggs

ORGANIC/GREEN EGGS

- Eggs produced by hens raised in their natural environment termed as organic/green eggs
- Eggs are much safer (no residues of antibiotics/hormones)
- Nutritive value may be lower if diets lacking nutrients
- Production% of organic eggs is lower hence much more expensive

EGGS AND CHLOSTEROL PANIC

- A 60 gm egg contains 198-208 mg cholesterol, general practioners advice their patients not eat eggs or only yolk, thus cause cholesterol panic
- American Heart Research Association recommended 4 eggs per week
- Not dietary cholesterol but total dietary fat is the actual reason
- Diet contains more saturated fatty acid tend to produce more serum cholesterol than do eggs

BASIC STEPS FOR FEED FORMULATION

- Fixed minor ingredients & slack space,5 kg. These included feed additives, salts etc.
- Levels of animal protein source- say 10 kg (fish meal 7 kg + meat meal 3 kg)
- The level of cereal by products may be fixed (e.g DORB , max. 8 kg)
- Veg. protein & energy sources are added to provide required protein
- Balancing the ME content of the diet.

BASIC STEPS FOR FEED FORMULATION

- Balancing the A.P content
- Balancing the Ca content
- Balancing the limiting amino acids content
- Balancing the Fibre content

- Finally, the has to be checked for total of ingredients and all for the nutrients to ensure that it is well balanced.

SOME METABOLIC DISEASES ASSOCIATED WITH NUTRITION

- **CAGE LAYER FATIGUE:**
  - ✓ Intake more energy
  - ✓ Less movement
  - ✓ Less production %
  - ✓ Deficiency of choline, methionine and certain amino acid in diet

CANNIBOLISM

- Deficiency of phosphorus in the diet
- Deficiency of sodium in the diet
- Less energy in the diet
- Less fibre content in the diet

Incidence in deep litter is more , may also seen in cage but degree of occurrence is less

FATTY LIVER SYNDROME

- Certain mycotoxin in feed (aflatoxin)
- Low protein & high energy in the diet
- Impaired metabolism of carbohydrate & fat
- Gluconeogenesis
- Deficiency of choline, biotin & methionine in the diet

BONE BREAKAGE

- Paralysis
- Decrease egg production
- Thin shelled egg
- Decrease Ca % in the ration
- Faulty management during pre-lay period.

THANK YOU