FORMULATION OF RATION FOR POULTRY

(BIS 1992)

There are 12 steps

1. **Fix/ leave slack space: 5 kg**
   For nutritive and non-nutritive feed additives, natural feed ingredients added at later stage while balancing the ration.
2. **Fix level of Animal Protein (fish meal/meat meal etc.): 10 kg** (for broiler starter, broiler finisher and Chick feeds). Its level may be reduced to 7 kg in the ration of grower and layer)
3. **Fix level of cereal by-products: 8 kg** (for broiler starter, broiler finisher and Chick feeds). Its levels may be increased up to 15-20% in the ration of grower and layer)
4. **Calculate proportion of Energy feed and Vegetable protein through Pearson square method**
5. **Balance ME content:** First calculate ME supply from above ingredients (already worked out from above steps), if there is shortage it can be meet out by addition of animal fat, vegetable oil or maize grain depending on the cost availability.
6. **Balance Available phosphorus:** Available P is considered as 30 % of the total P content present in vegetable sources i.e. grains, grain byproducts, oil seed cake/meal. Total P present in animal sources and inorganic mineral supplements is considered as 100 % available P. Calculate available P supply from the above feed ingredients, total it. If there is shortage can be meet out by addition of desired quantity of DCP (Di calcium phosphate).
7. **Balance Calcium Content:** First calculate Ca supply through above feed ingredients and DCP and total it. If there is any shortage it can be meet out by addition of desired quantity of lime stone powder/other calcium supplement (**In layer ration about 4 % Oyster shell grit/calcite grit is essentially added as a source of Ca).**
8. **Balance Sodium content:** Usually Na supply from feed ingredients is not calculated and common salt is incorporated @ 0.5 %. However, if animal sources like fishmeal/meat meal contains higher level of salt then accordingly you adjust the addition of common salt.

9. **Balance Limiting amino acids (Lysine & Methionine):** Calculate supply of both amino acids from above all feed ingredients, total it and compare with requirements, if there is any deficit, it can be meet out by addition of synthetic L-Lysine and DL-Methionine available in the market.
10. **Check Crude fiber level:** calculate CF contributed by different feed ingredients, total it and compare with recommended Max. CF levels given in the feeing standard, it should not be higher than that level.
11. Finally total, quantities of feed ingredients and each nutrients it should match with the recommended nutrient levels given in the feeding standards**.**
12. Vit A. D_3 K, E, Choline etc. are necessarily added. In addition to this toxin binder, Antibiotic growth promoters/probiotics, preservatives are also added.

Problem 1: Formulate 100 kg broiler starter (as per BIS 1992) ration using following feed ingredients/ supplements: Maize, GNC/soya Doc, Deoiled Rice Bran (DORB), Fishmeal, Di-calcium phosphate (DCP), Lime Stone Powder (LSP), Synthetic Lysine, Methionine, Trace mineral & vitamin mixture.

Nutrient Requirement Broiler starter (BIS,1992)	CP %	ME Kcal/Kg	Ca %	Available P %	Lysine %	Methionine %	CF %
	23	2800	1.2	0.5	1.2	0.5	6.0

Chemical composition of feed ingredients/ supplements

Feed ingredient/ supplement	DM %	CP %	EE %	CF %	ME Kcal/kg	Ca %	P %	Lysine %	Methio-nine %
Maize	89	9.0	3.8	2.2	3340	0.02	0.28	0.22	0.18
GNC (Expeller)	90	40	7.3	13.0	2600	0.16	0.56	1.5	0.42
DORB	91	13.5	0.6	14.0	2200	0.07	1.50	0.6	0.25
Fish meal	91	42	5.0	1.0	2400	3.73	2.43	3.2	1.10
DCP	-	-	-	-	-	21.0	18.5	-	-
LSP	-	-	-	-	-	36.0	-	-	-
Lysine	-	-	-	-	-	-	-	100	--
Methionine	-	-	-	-	-	-	-	-	100

Step 1: leave slack space**:** **05 kg**

Step 2: Fix level of Animal Protein (fish meal)**:** **10 kg**

Step 3: Fix level of cereal by-products i.e. DORB**:** **08 kg**

Total Quantity fixed **23 kg**

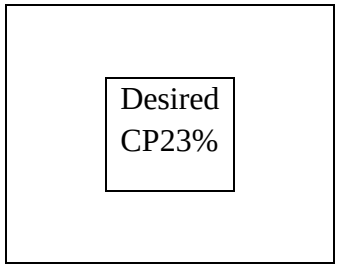
Now calculate CP supply from above quantity	**CP (kg)**
Slack space: 05 kg ……	**.0.00**
Fish meal (if CP content is 42 %) 10 kg – 42/100x10 =	**4.20**
DORB (if CP value is 13.50 %) 08 kg – 13.50/100x8 =	**1.08**
	5.28

CP required to be supplemented through 77 kg [(100 (qty. to be prepared) - 23 kg (qty. already fixed)] is 17.72 kg [23 (required CP) – 5.28 (CP supplied by qty. of ingredients fixed)]

Therefore CP desired in percentage will be 17.72/77x100 = 23.01 %

Step 4: Calculate proportion of Energy feed and Vegetable protein through Pearson square method

Maize CP 9 % 17



GNC
CP 40% 14

Total 31

In Pearson square method is used to get the proportion of two feeds, in our case, maize and GNC. Desired level of CP in the mixture is kept in middle of the square while at left upper corner CP value of maize and at left lower corner CP content of GNC is kept. All three values should be in %. First minus values of left upper and left lower corners from

the middle value. Always minus lower value from higher one diagonally as shown in the above square, viz. 40 - 23 = 17 keep on right upper corner (indicate proportion of GNC), similarly 23 – 9 = 14 (indicate proportion of maize), keep this value at right lower corner. Now, make total of values at right corners. Then work out the proportion of two feeds as shown below

Proportion of maize in the remaining quantity (77 kg) = 17/31x77 = 42.22 kg

Proportion of GNC in the remaining quantity (77 kg) = 14/31x77 = 34.78 kg

Ingredients	Qty (kg)	CP %	ME Kcal/kg	Av. P %	Ca %	Ly %	Me %	CF %
NR (BIS1992)	**-**	**23**	**2800**	**0.5**	**1.2**	**1.2**	**0.5**	**6.0**
Fish meal	10.00	4.20	240.00	0.243	0.373	0.320	0.110	0.10
DORB	08.00	1.08	176.00	0.120	0.006	0.048	0.020	1.12
Maize	42.22	3.78	1410.15	0.118	0.008	0.093	0.076	0.93
GNC	34.78	13.91	904.28	0.195	0.556	0.522	0.146	4.52
Total	--	**22.97**	**2730.43**	**0.373**	0.943	0.983	0.352	6.67
Shortage	--	**00.03**	**69.57**	**0.127**	**0.257**	**0.217**	**0.148**	--
Maize(balancing of ME)	02.00	00.18	68.80	--	--	--	--	--
DCP	0.690	--	--	0.128	0.145	--	--	--
Shortage of Ca	--	--	--	--	0.112	--	--	--
LSP	0.315	--	--	--	0.113	--	--	--
Lysine	0.217	--	--	--	--	0.217	0.148	--
Methionine	0.148	--	--	--	--	--	--	--
TM+Vit+ other additives	1.630	--	--	--	--	--	--	--
Total	**100.0**	**23.15**	**2799.23**	**0.501**	**1.201**	**1.200**	**0.500**	**6.67**

How nutrient supply is calculated

1. **CP (kg)** = CP value/100 x quantity of feed (kg). The CP content of fish meal is 42 % and quantity added is 10 kg. Therefore, CP supply through fish meal will be 42/100 x 10 = 4.2 kg. Similarly CP supply from other ingredients is find out.
2. **ME (kcal/kg)** = ME content x quantity of feed/ 100. For example ME content of maize is 3340 kcal/kg and quantity incorporated is 42.22 kg. Therefore, ME supply through maize will be 3340 x 42.22 = 141014.8/100 = 1410.15 kcal/kg. Similarly ME supply from other ingredients is find out.
3. **Available P**, (only 30 % of P present in vegetable sources is considered as available P) first P supply from vegetable sources (maize. DORB and GNC) is calculated individually, thereafter total supply of P from vegetable sources is worked out, then 30 % of this total is considered to get the available P. While in case of fish meal and di-calcium phosphate whatever P present is considered as available P. For example in our case P supply through DORB, Maize and GNC is 0.120, 0.118 and 0.195 kg,

respectively. Sum total of these values is 0.433 kg and 30 % of this is calculated as 30/100x 0.433= 0.130 kg i.e. actually added.

Step 5. ME is balanced by addition of 2 kg maize grain (within the slack place provided in step 1)

Step 6. Available P is balanced by addition of 0.690 kg DCP (within the slack place provided in step 1)

Step 7. Ca is balanced by addition of 0.315 kg LSP (within the slack place provided in step 1) because 0.145 kg Ca is also available through DCP

Step 8. Na may be balance by addition of 0.50% common salt.

Step 9 & 10. Lysine and methionine are balanced by addition of same quantity i.e. 0.217 Kg and 0.148 kg synthetic lysine & methionine, respectively (within the slack place provided in step 1)

Step 11. CF level is higher by 0.67 %, this is because of higher level of CF in DORB (14 %), therefore DORB should checked before use for CF level, it should not be higher.

Note: by using same steps you can formulate diets for (Practice at home)

Problem 2. Prepare 100 kg ration for broiler finisher using same above feed ingredients and Supplements.

Note: You can fix quantity of fish meal, DORB at same levels as in case of broiler starter.

Problem 3. Prepare 100 kg ration for chick using same above feed ingredients and Supplements..

Note: You can fix quantity of fish meal, DORB at same levels as in case of broiler starter.

Problem 4. Prepare 100 kg ration for growing chicken using same above feed ingredients and Supplements.

Note: in this case, animal protein feed (fish meal) may be fixed at 8 kg instead of 10kg and DORB may be fixed at 25 kg in place of 08 kg..

Problem 5. Prepare 100 kg ration for Laying chick using same feed ingredients and Supplements.

Note: in this case, animal protein feed (fish meal) may be fixed at 8 kg instead of 10kg and DORB may be fixed at 15 kg in place of 08 kg. In addition to this Oyster shell grit/ calcite grit must be incorporated @ 4 %, therefore fix quantity of this initially at 4 kg.