

**NUTRIENT REQUIREMENT
AND FEEDING SCHEDULE
FOR
LIVESTOCK AND POULTRY**

(ANN - 221)

.....
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AVG. CHEMICAL COMPOSITION & NUTRITIVE VALUE OF COMMON FEEDS & FODDERS
[ON-DM Basis]
TABLE-1

No.		CP (%)	EE (%)	CF (%)	NFE (%)	ASH (%)	Ca (%)	P (%)	DCP (%)	TDN (%)
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	GREEN FODDERS									
1.	Berseem	17.3	1.9	25.9	40.7	14.2	1.90	0.28	12.8	62.2
2.	Lucerne	20.2	2.3	30.1	36.7	10.7	1.24	0.35	16.2	60.2
3.	Lobia	28.1	3.0	26.7	33.0	9.2	1.43	0.30	20.3	62.2
4.	Jowar (Young stage)	12.8	2.6	26.5	45.4	12.7	0.70	0.41	7.8	52.0
	(Flowering)	7.6	1.9	30.7	50.4	9.4	0.42	0.35	3.4	56.3
	(Prime)	4.9	1.5	33.1	52.7	7.8	0.45	0.11	1.2	55.8
5.	Maize (Young stage)	12.1	1.1	29.6	44.2	13.0	0.68	0.21	6.0	65.6
	(Flowering)	6.4	0.9	29.9	51.2	11.6	0.61	0.19	4.7	71.2
	(Dough)	5.1	1.5	26.9	59.2	7.3	0.49	0.19	1.6	65.2
6.	OAT (Young)	14.6	2.1	32.9	36.5	13.9	0.48	0.33	10.6	72.0
	(Flowering)	10.8	1.8	31.0	45.9	10.4	0.43	0.26	7.7	72.0
	(Milk stage)	6.4	2.3	28.7	53.3	9.3	0.47	0.22	2.8	55.0
7.	Napier grass (Hybrid)									
	1 st year	11.5	2.2	25.9	44.5	15.9	0.68	0.32	7.6	60.0
	2 nd year	5.9	1.1	28.0	45.2	19.8	0.57	0.49	2.1	58.0

8.	Paragrass	9.4	0.8	28.2	50.1	10.4	0.37	0.32	7.9	56.2
9.	Guinea grass (early)	7.9	1.2	38.4	37.0	15.5	0.51	0.39	5.8	65.1
	(late)	4.8	0.8	42.1	40.8	12.3	0.39	0.31	3.1	52.3
	SILAGE									
10.	Jowar	5.9	1.8	37.3	44.4	10.6	0.46	0.18	2.4	51.1
11.	Maize	7.9	1.1	24.6	55.1	11.3	0.60	0.18	3.4	61.1
12.	OAT (Immature)	11.9	2.8	13.4	49.3	12.6	0.46	0.35	8.8	62.6
	(Dough stage)	8.5	2.0	30.7	45.1	13.7	0.35	0.25	4.1	62.2
	HAYS									
13.	Berseem	14.7	1.6	30.6	41.0	12.1	1.48	0.28	10.3	58.0
14.	Lucerne	21.3	1.4	29.4	35.2	12.7	1.65	0.12	16.4	55.9
15.	Lobia (Cow Pea)	11.4	1.4	32.8	45.8	8.6	1.00	0.23	7.5	55.6
16.	Mixed grass (Ripe)	1.6-11.0	0.6-3.0	18-44	40-62	7-17	0.26-1.33	0.04-0.41	0.0-5.8	30-57
	CEREAL STRAWS									
17.	Rice / Paddy	3.8	1.6	30.6	43.6	20.4	0.36	0.11	0.0	41.0
18.	Wheat	2.4	1.0	39.6	42.9	14.1	0.30	0.07	0.0	40.0
19.	Pearl millet	3.1	1.2	40.4	48.5	6.8	0.39	0.36	0.9	53.4
	GRAINS									
20.	Jowar	12.5	3.4	2.2	79.9	2.0	0.04	0.31	6.1	85.7
21.	Maize	10.6	3.3	2.2	82.1	1.8	0.07	0.40	7.0	87.1
22.	OAT	8.8	4.3	18.3	63.8	4.8	0.12	0.37	4.4	71.1
23.	Rice broken	7.0	0.4	0.6	87.4	4.6	0.16	0.16	5.6	90.6

24.	Cottonseed	19.5	18.3	19.8	36.8	5.6	0.24	0.65	12.9	88.8
	OIL CAKES									
25.	Cotton seed cake (Decorticated)	38.5	9.2	6.3	38.0	8.09	0.21	0.61	31.6	86.0
	(Undecorticated)	-	-	-	-	-	-	-	18	70
26.	Ground Nut cake (Expeller)	51.8	8.2	7.4	26.9	5.7	0.20	0.56	46.4	78.9
	(Decorticated)									
27.	Ground Nut cake (Decorticated)	55.3	1.2	4.2	31.8	7.5	0.25	0.62	49.1	77.0
	(solvent extracted)									
28.	Mustard cake Extracted/ Rape	38.3	7.8	6.6	38.9	9.2	0.66	1.07	30	74
29.	Sesame cake/ Til Cake	42.5	4.7	5.2	35.4	12.2	1.40	0.76	34.0	70.0
30.	Soya cake (Ext.)	48.7	5.2	6.7	33.8	6.3	0.27	0.63	41.4	80
31.	Saff flower cake	42.8	8.5	15.2	26.6	6.8	-	-	32.0	69.0
32.	Sunflower cake Extracted	26.2	20.5	22.9	23.6	6.8	-	-	22.7	71.0
	GRAIN BY PRODUCT									
33.	Wheatbran	11.5	2.9	12.7	62.5	10.4	0.14	1.24	8.7	70.4
34.	Ricebran	14.0	20.4	14.1	35.7	15.8	0.16	2.71	9.1	72
	DORB	-	-	-	-	-	-	-	8	65
35.	Arhar chuni	17.5	5.1	26.2	46.2	5.0	0.66	0.33	10.0	67.0
36.	Gram chuni	13.5	3.8	28.7	47.2	6.8	0.92	0.25	7.00	62.4
37.	Mung chuni	16.3	5.6	19.1	54.2	4.7	0.50	0.32	8.8	67.3
38.	Gram Husk	5.7	0.9	48.4	39.0	6.0	1.18	0.05	0.0	61.3
39.	Maize Husk	8.1	1.5	15.7	72.5	2.2	0.31	0.09	4.5	67.0
40.	Molasses	4.3	0.1	-	84.8	10.8	0.89	0.08	2.4	96.0

41.	Maize Gluten	48.2	8.6	0.5	40.4	2.3	0.07	0.55	42	78
42.	ANIMAL PROTEIN SUPPLEMENT									
	Fish Meal	-	-	-	-	-	7-8	4-5	45	55
43.	Meat Meal	-	-	-	-	-	8-10	4-5	45	70
44.	Pulse/ Legume straw (Masoor, gram)						1-1.4	0.12-0.15	6-8	50-55

Note :- In calculating the contents of nutrients on fresh basis the DM content of different types of feeding stuffs may assumed to have the following Avg. values (In%) : All air-dried material such as straw, hay, grain, cake & by-Products, 90; silages, 30; green legumes (Immature 1st or 2nd CUT) 15; Green Legumes (3rd and subsequent cuts) 20; green non-legumes (Immature) 20; green non-legume (flowering) 25; sorghum (prime) 30; sorghum (ripe) 40; molasses, 75.

**CHEMICAL COMPOSITION & NUTRITIVE VALUE OF UNCONVENTIONAL FEEDS (% D M B)-
TABLE.2**

No.	Unconventional animal feeds	CP (%)	DCP (%)	TDN (%)	Ca (%)	P (%)	Toxic principle	Level of inclusion
1	2	3	4	5	6	7	8	9
1.	Ambadi Cake	23.4	18.7	63.8	-	-	Nil	20% in con. mix. Of crossbred calf
2.	Karanj Cake	34.1	25.5	62.0	3.3	-	Karanjine	50% in con. mix cm of crossbred calf & lactating
	[Solvent Extracted]							
3.	Kokam Cake	16.6	9.3	80.0	-	-	Nil	15% in con. mix of crossbred cow
4.	Kosum Cake	22.1	14.7	79.6	0.49	1.09	HCN	35% in con. mix of CBC & (2.4mg/ 100g)
5.	Mahua Seed Cake	20.4	9.3	49.8	0.4	0.2	Mowrin (19%)	20% in con. mix of crossbred cow
6.	Niger Seed Cake	34.2	32.7	49.4	0.2	-	Nil	30% in con. mix of crossbred cow
7.	Salseed Cake	8.6	0.1	57.8	0.3	0.2	Tannins (8-10%)	10% in con. mix of milch animal
8.	Mango Seed Kernels	80.7	6.1	70.0	0.4	0.3	Tannins (5-6%)	10% in con. mix of milch animal
9.	Vilaytei babul Pods	12.5	7.0	75.0	0.43	0.2	Tannins (.75-1.5%)	20-30% in con. mix of growing calf milch cattle
10.	Sunflower Bhusa	2.8	-	-	1.40	0.09	Tannins (1.5%)	15% In complete Ration of Ruminants
11.	Sunflower Heads	7.2	-	-	0.9	0.12	Tannins (1.5%)	15% In complete Ration of Ruminants
12.	Panewar Seeds (Casia tora)	18.6	15.9	66.0	0.9	0.6	Crysophanic Acid.083% Tannic Acid .8%	15% In con. mix of milch animal
13.	Babul Seeds	17.6	13.8	59.0	-	0.3	Tannins 5%	30% in con. mix of CB Cow
14.	Tamarind Seed Powder (Decorticated)	19.8	1.26	63.92		-	Nil	25% in calf starter

DAILY NUTRIENT REQUIREMENT OF CALF* (RAY, 1978)
TABLE - 3

BW	DCP	TDN	ME	Ca	P	Carotene	Vit. A
(Kg)	(Kg)	(Kg)	(Mcal)	(g)	(g)	(mg)	(1000 IU)
45	0.17	0.9	3.29	7	6	5	2
70	0.22	1.3	4.68	12	10	7.5	3
100	0.28	1.9	6.90	13	10	10	4
150	0.35	2.6	9.36	13	12	16	6.5
200	0.40	3.2	11.50	13	12	21	8.5
300	0.47	4.1	14.80	15	14	31	12.5

*** Daily growth rate is 0.5 Kg during the first 2 years of age**

DAILY NUTRIENT REQUIREMENTS FOR CATTLE & BUFFALOES (Kearl, 1982)

TABLE - 4

CATTLE									BUFFALOES						
				Protein				Vit			Protein				Vit
BWT. (kg)	Gain (kg)	DMI (% B WT.)	TDN (Kg)	Total (g)	Digestible (g)	Ca (g)	P (g)	A 1000 IU	DMI (%BW)	TDN (kg)	Total	Digestible (g)	Ca (g)	P (g)	A (1000 IU)
Maintenance and Growth															
100	0	2.2	1.0	167	90	5	5	5	2.4	1.09	163	80	4	4	5
	0.5	3.0	1.6	379	254	15	9	6	2.8	2.47	373	254	14	11	6
150	0	2.0	1.4	231	123	6	6	6	2.2	1.48	223	109	5	5	6
	0.5	2.8	2.2	474	305	16	10	9	2.7	2.86	486	319	14	12	9
200	0	1.9	1.8	285	152	6	6	8	2.0	1.84	288	135	6	6	8
	0.5	2.6	2.8	554	348	16	12	12	2.6	3.22	543	314	14	13	12
250															
300	0	1.7	2.4	385	206	10	10	10	1.9	2.49	377	183	9	9	10
	0.5	2.3	3.7	679	411	19	14	13	2.3	4.01	663	402	17	16	13
350	0	1.6	2.6	432	231	12	12	12	1.8	2.79	426	205	10	10	12
	0.5	2.3	4.1	731	433	20	16	18	2.2	4.45	703	416	17	15	15
400	0	1.6	2.9	478	256	13	13	13	1.8	3.09	469	227	11	11	13
	0.5	2.2	4.6	772	447	21	18	17	2.1	4.88	740	428	17	16	16
450	0	1.5	3.2	528	279	14	14	14	1.7	3.37	515	248	12	12	14
	0.5	2.1	5.0	805	456	22	20	17							
500	0	1.5	3.4	567	302	15	15	15	1.7	3.65	556	268	13	13	14
	0.5	2.1	5.4	831	457	23	21	19	1.9	5.27	786	433	16	16	18

Requirements for zero gain indicate for maintenance; Requirements for 0.5 Kg gain indicate for maintenance and growth; Gain of 0.5 Kg was chosen to compare them with those of Indian requirements.

**DAILY NUTRIENT REQUIREMENTS FOR MAINTENANCE, PREGNANCY
FOR CATTLE & BUFFALOES***

(Ranjhan, 1998)

TABLE - 5

Body Weight (kg)	Dry Feed (kg)	DCP (g)	ME (Mcal)	TDN (kg)	Ca (g)	P (g)	Carotene (mg)	Vitamin A (1000 IU)
1	2	3	4	5	6	7	8	9
Maintenance of Mature Cows/ Buffaloes**								
200	3.5	150	6.0	1.7	8	7	21	9
250	4.0	170	7.2	2.0	10	9	26	11
300	4.5	200	8.4	2.4	12	10	32	13
350	5.0	230	9.4	2.7	14	11	37	15
400	5.5	250	10.8	3.0	17	13	42	17
450	6.0	280	12.4	3.4	18	14	48	19
500	6.5	300	13.2	3.7	20	15	53	21
550	7.0	330	14.4	4.0	21	16	58	23
600	7.5	350	15.5	4.2	22	17	64	26
650	8.0	370	16.2	4.5	23	18	69	28
700	8.5	390	17.3	4.8	25	19	74	30
750	9.0	410	18.0	5.0	26	20	49	32
800	9.5	430	19.1	5.3	27	21	85	34
Maintenance and Pregnancy (last 2 months of gestation)								
250	4.9	270	10.8	3.0	14	12	51	21
300	5.6	290	12.4	3.4	16	14	56	25
350	6.4	320	13.2	3.7	21	16	67	27
400	7.2	350	14.1	4.1	23	18	76	30
450	7.9	400	15.9	4.4	26	20	86	34
500	8.6	430	17.3	4.8	29	22	95	38
550	9.3	465	18.8	5.2	31	24	105	42
600	10.0	500	20.2	5.6	34	26	114	46

* During the first and second lactation, in Order to allow the growth of the lactating cows/ buffaloes, add about 20 and 10 percent of the maintenance allowance respectively .

* Ranjhan, S.K., 1998, Nutrient Requirements of live* stock and poultry ICAR, New Delhi.

650	10.6	530	21.6	6.0	36	28	124	50
700	11.3	550	22.7	6.3	39	30	133	53
750	12.0	600	24.2	6.7	42	32	143	57
800	12.6	630	25.6	7.1	44	34	152	61

**NUTRIENT REQUIREMENTS FOR PER Kg MILK PRODUCTION
(Ranjhan, 1998)**

TABLE-6

Fat (%)	DCP (g)	ME (Mcal)	TDN (Kg)	Ca (g)	P (g)
3.0	40	0.97	0.270	2.5	1.8
4.0	45	1.13	0.315	2.7	2.0
5.0	51	1.28	0.370	2.9	2.2
6.0	57	1.36	0.410	3.1	2.4
7.0	63	1.54	0.460	3.3	2.6
8.0	69	1.80	0.510	3.5	2.8
9.0	75	2.06	0.560	3.7	3.0
10.0	81	2.16	0.600	3.9	3.2
11.0	85	2.34	0.650	4.1	3.4

DAILY NUTRIENT REQUIREMENT OF LACTATING & PREGNANT COWS (NRC, 1989)

TABLE- 6.1

Live Weight (kg)	Total CP (g)	Energy			Minerals		Vitamins	
		NEL (Mcal)	ME (Mcal)	TDN (kg)	Ca (g)	P (g)	A (1000 IU)	D (1000 IU)
Maintenance of mature Lactating Cows ^a								
400	318	7.16	12.10	3.13	16	11	30	12
450	341	7.82	13.12	3.42	18	13	34	14
500	364	8.46	14.20	3.70	20	14	38	15
550	386	9.09	15.25	3.97	22	16	42	17
600	406	9.70	16.28	4.24	24	17	46	18
Maintenance Plus last 2 Months of Gestation of Mature Dry Cows ^b								
400	890	9.30	15.26	4.15	26	16	30	12
450	973	10.16	16.66	4.53	30	18	34	14
500	1053	11.00	18.04	4.90	33	20	38	15
550	1131	11.81	19.37	5.27	36	22	42	17
600	1207	12.61	20.68	5.62	39	24	46	18
Milk Production-Nutrients/ kg of Milk of Different Fat Percentages								
Fat%								
3.0	78	0.64	1.07	0.280	2.73	1.68	-	-
3.5	84	0.69	1.15	0.301	2.97	1.83	-	-
4.0	90	0.74	1.24	0.322	3.21	1.98	-	-
4.5	96	0.78	1.32	0.343	3.45	2.13	-	-
5.0	101	0.83	1.48	0.364	3.69	2.28	-	-
5.5	107	0.88	1.48	0.385	3.93	2.43	-	-

- a. To allow for growth of young lactating cows, increase the maintenance allowances for all nutrients except vitamins A and D by 20% during the first lactation and 10% during the 2nd lactation.
- b. Values for calcium assume that the cow is in calcium balance at the beginning of the last 2 months of gestation. If the cow is not in balance, then the calcium requirement can be increased from 25 to 33%.

DAILY NUTRIENT REQUIREMENT FOR BREEDING BULLS

(Sen, Ray and Ranjhan, 1978)

TABLE - 7

Body wt (kg)	DCP (g)	TDN (kg)	ME (Mcal)	Ca (g)	P (g)	Carotene (mg)	Vit A (1000 IU)
400	380	3.6	13.0	18	13	40	16
500	450	4.5	16.2	20	15	53	21
600	530	5.4	19.4	22	17	64	26

DAILY NUTRIENT REQUIREMENT FOR WORKING

(Sen, Ray and Ranjhan, 1978)

TABLE - 8

Body Wt. (kg)	Normal *				Heavy work**			
	DM (kg)	DCP (kg)	TDN (kg)	ME (Mcal)	DM (kg)	DCP (kg)	TDN (kg)	ME (Mcal)
200	4.00	0.24	2.00	7.20	5.00	0.25	2.70	9.50
300	5.80	0.33	3.10	11.4	7.00	0.42	4.00	14.4
400	7.60	0.45	4.00	14.4	9.80	0.57	4.80	17.3
500	9.40	0.56	4.90	18.0	11.2	0.71	6.40	23.0
600	11.20	0.66	5.80	20.8	13.40	0.82	8.00	28.8

* 6 hrs of carting or 4 hrs of ploughing.

** 8 hrs of carting or 6 hrs of ploughing.

DAILY NUTRIENT REQUIREMENT FOR WORKING

BULLOCKS

(Kearl's, 1982)

TABLE - 9

BW (kg)	DMI (%BW)	TDN (kg)	Protein		Ca (g)	P (g)	Vir. A (1000 IU)
			Total (g)	Digestible (g)			
Working cattle							
Moderate work							
300	2.2	3.1	460	227	10	10	10
400	2.1	4.0	573	283	13	13	13
500	2.0	4.8	678	332	15	15	15
600	1.9	5.6	759	370	17	17	17
Heavy work							
300	2.2	3.9	483	241	10	10	10
400	2.3	5.0	600	287	13	13	13
500	2.1	6.1	729	362	15	15	15
600	2.1	7.1	848	418	17	17	17
Working buffaloes							
Moderate work							
200	2.4	2.4	455	272	10	9	10
300	2.2	3.3	577	335	13	11	13
400	2.0	4.1	644	354	17	13	17
500	1.9	5.0	617	295	20	15	21
600	1.8	5.8	709	339	22	17	26
Heavy work							
200	2.4	2.9	486	299	10	9	10
300	2.2	4.1	623	369	13	11	13
400	2.2	5.2	715	389	17	13	17
500	2.2	6.3	699	325	20	15	21
600	2.1	7.4	815	373	22	17	26

'BIS' SPECIFICATIONS FOR CATTLE FEEDS

TABLE - 10

No.		Moisture (%)	CP (%)	EE (%)	CF (%)	AIA (%)
1.	Ground Nut Cake					
	Grade - I	8	48	7	8	2.0
	Grade - II	8	43	6	12	2.5
	Solvent Extracted Cake					
	Grade - I	8	51	-	7	2.5
	Grade - II	8	47	-	10	2.5
2.	Cotton Seed Cake					
	[Decorticated]					
	Grade - I	8	40	7	12	2.0
	Grade - II	8	35	6	15	2.5
	[Undecorticated]					
	Grade - I	8	24	7	22	2.0
3.	Grade - II	8	20	5	26	2.5
	Linseed Cake [Linseed cake]					
	<u>Expeller</u>					
	Grade - H.F. [High Fat]	8	29	8	10	1.5
	Grade - L.F. [Low Fat]	8	31	5	10	1.2
	<u>Ghani</u>	8	26	15	6	2.5
4.	Solvent Extracted Cake					
	Special grade	10	33	1.5	9	2.5
	Grade - A	10	29	1.5	11	2.5
	Mustard Cake					
	Type - 1	10	37	5	8	1.5
	Type - 2	10	35	8	3	2.0
5.	Wheat bran	12.5	13	-	12.	0.25
6.	Rice polish	10	11	15	4	1.5
7.	Calf starter Meal	10	23-26	4	7	2.5
8.	Calf growth Meal	10	22-25	4	10	3.5
9.	Concentrate mixture for Lactating cow					
	Type - 1	11	22	3	7	3.0
	Type - 2	11	20	2.5	12	4.0

'BIS' SPECIFICATIONS FOR MINERAL MIXTURES FOR CATTLE AND POULTRY

TABLE - 11

S. NO.	Characteristic	MM for Poultry	Min. Mix for Cattle	
			Type I	Type II
i)	Moisture per cent by mass, Max	3	5	5
ii)	Calcium per cent by mass, Min	32	18	23
iii)	Phosphorus, per cent by mass, Min	6	9	12
iv)	Magnesium, per cent by mass, Min	-	5	6.5
v)	Salt(chlorine as Sodium chloride), per cent by mass, Min	Nil	22	-
vi)	Iron, per cent by mass, Min	1000ppm	0.4	0.5
vii)	Iodine (as KI), per cent by mass, Min	0.01	0.02	0.026
viii)	Copper, per cent by mass, Min	100 ppm	0.06	0.077
ix)	Manganese, per cent by mass, Min	0.27	0.1	0.12
x)	Cobalt, per cent by mass, Min	Nil	0.009	0.012
xi)	Fluorine, per cent by mass, Max	0.30	0.05	0.07
xii)	Zinc, per cent by mass, Min	0.26	0.3	0.38
xiii)	Sulphur, per cent by mass, Max	-	0.4	0.5
xiv)	Acid insoluble ash, per cent by mass, Max	2.5	3	2.5

Note : Values from 2 to 13 are on moisture free basis

COMPOSITION OF PREPARED MINERAL MIXTURE AS PER BIS STANDARDS

TABLE - 11.1

← **Cattle** →

Particulars	Type 1	Type 2	For Poultry
DCP	39.52	52.70	26.35
CaCO ₃	32.46	39.95	64.92
Nacl	22.00	Nil	Nil
FeSO ₄	2.49	3.14	0.0001
KI	0.78	0.10	0.01
CuSO ₄	2.00	0.25	0.001
MnCl ₂	0.36	0.50	0.97
CoCl ₂	0.07	0.07	Nil
ZnO	Nil	Nil	0.32
Total (Kg)	99.68	96.71	92.57

To make up the quantity 100 kg either add some economic inert material like starch or CaCO₃ or convert the amount of each Salt in to parts/100 kg using following formulae-

$$\text{Quantity in parts/ 100 kg} = \frac{\text{Quantity of Salt in question} \times 100}{\text{Quantity of all Salts}}$$

**CLFMA SPECIFICATION FOR COMPOUND FEEDS FOR
CATTLE & BUFFALOES TABLE - 12**

Item	Types of feed			
	Dairy Special	I	II	III
Moisture, % max	12	12	12	12
CP, % min	22	20	18	16
UDP, % min	8	-	-	-
EE, % min	3	2.5	2.5	2
CF, % max	7	7	12	14
AIA, % max	3.5	4	4.5	5
<u>Recommended levels of feeding, kg/ day</u>				
<u>cows / buffaloes</u>				
<u>low yielders^c</u>				
Maintenance				1.0(1.0) ^a
Production (kg/ kg milk)				0.5(0.5)
<u>Medium yielders</u>				
Maintenance			1.0(1.5)	
Production (kg/ kg milk)			0.5(0.5)	
<u>High yielders^b</u>				
Maintenance		1.0(1.5)		
Production (kg/ kg milk)		0.4(0.5)		

Note :- a. Value in parentheses are for buffaloes.

b. For cows yielding 20 kg Milk-maintenance 1.5 kg and for every kg of milk yield 0.4 kg of dairy special.

c. Fifty g extra per kg milk for every additional 0.5% milk fat over 4%.

SPECIFICATIONS FOR BY - PASS PROTEIN (NDDB)

TABLE - 13

S.No.	Characteristics	Requirement
1.	Moisture, per cent by mass, Max	10
2.	CP (N x 6.25), per cent by mass, Min	30
3.	EE, per cent by mass, Max	3.5
4.	CF, per cent by mass, Max	8
5.	AIA, per cent by mass, Max	2.5
6.	UDP, per cent by mass, Min	20
7.	RDP, per cent by mass, Max	9

Note:-The values for characteristics 2 to 7 are on moisture free basis.

SPECIFICATIONS FOR UREA MOLASSES MINERAL BLOCK

TABLE - 14

S.No.	Characteristics	Requirement
1.	moisture, per cent by mass, Max	3.5
2.	CP (N x 6.25), per cent by mass, Min	58.0
3.	CF, per cent by mass, Max	2.0
4.	Total ash, per cent by mass, Max	34.0
5.	AIA, per cent by mass, Max	3.0
6.	Calcium, per cent by mass, Max	4.0
7.	Phosphours, per cent by mass, Min	1.5
8.	Sulphur, per cent by mass, Min	1.0
9.	Urea, per cent by mass, Max	15.0

Note:-The values for characteristics 2 to 9 are on moisture free basis.

COMPLETE FEEDS FOR CATTLE

TABLE - 15

Ingredients (%)	Name of the crop residue				
	Dry forest grass	Sorghum straw	Wheat straw	Cotton straw	Sunflower straw
Dry forest glass	47.5	-	-	-	-
Sorghum straw	-	46.0	-	-	-
Wheat straw	-	-	50.0	-	-
Cotton straw	-	-	-	45.0	-
Sunflower straw	-	-	-	-	35.0
Tapioca chips	-	20.0	-	-	-
Groundnut cake	10.0	10.0	10.0	10.0	-
Maize grain	10.0	-	-	-	-
Cage layer droppings (dried)	-	10.0	15.0	-	-
Cottonseed cake	-	-	-	-	25.0
Mol asses	10.0	12.0	13.0	15.0	8.5
Deoiled rice bran	-	-	10.0	-	10.0
Wheat bran	20.0	-	-	10.0	10.0
Rice bran	-	-	-	10.0	10.0
Urea	-	0.5	0.5	1.5	-
Mineral mixture	1.8	1.0	1.0	1.0	1.0
Common salt	0.7	0.5	0.5	0.5	0.5
<i>Nutritive value</i>					
DCP (%)	7.7	7.0	7.3	9.5	5.3
TDN (%)	63.1	56.4	51.8	48.6	56.2

Nutrient Requirements For Growing Lambs (Ranjhan, 1998).**TABLE - 16**

Live Weight (kg)	Rate of gain (g/day)	DM (g)	DCP (g)	TDN (g)	Ca (g)	P (g)
10	50	300	32	195	1.5	1.0
	100	340	37	220	1.7	1.1
	150	385	42	250	1.9	1.3
15	50	450	48	290	2.2	1.5
	100	510	55	330	2.5	1.7
	150	580	60	375	2.9	1.9
	200	690	75	450	3.4	2.3
20	50	600	55	360	3.0	2.0
	100	680	63	410	3.4	2.3
	150	830	77	500	4.1	2.8
	200	1000	92	600	5.0	3.3
25	50	750	65	450	3.7	2.5
	100	850	73	510	4.2	2.8
	150	1040	89	625	5.2	3.5
	200	1250	107	750	6.2	4.2
30	50	900	74	520	4.5	3.0
	100	1035	86	600	5.2	3.4
	150	1290	107	750	6.4	4.3
	200	1550	128	900	7.7	5.2

Nutrient Requirements For Maintenance of Adult Sheep (Ranjhan, 1998).**TABLE - 17**

Live Weight (kg)	DM (g)	DCP (g)	TDN (g)	Ca (g)	P (g)
20	575	28	258	1.1	0.8
25	678	33	305	1.3	0.9
30	775	38	350	1.5	1.0
35	873	43	393	1.7	1.2
40	964	48	434	1.9	1.3
45	1055	53	475	2.3	1.5
50	1040	56	543	2.3	1.5
55	225	60	551	2.4	1.6
60	1310	65	558	2.6	1.7

Mineral requirements are based on NRC (1985)

Dairy Nutrient Requirements of Pregnant Ewes (Ranjhan, 1998).**TABLE - 18**

BW (kg)	DM (g)	DM (%B.wt)	DCP (g)	TDN (g)	Ca (g)	P (g)
25	1,120	4.5	80	580	3.4	2.4
30	1,280	4.3	90	665	3.8	2.7
35	1,440	4.1	105	750	4.3	3.1
40	1,590	4.0	115	827	5.2	3.7
45	1,740	3.9	135	903	5.6	4.0
50	1,880	3.8	135	978	5.6	4.3
55	2,020	3.7	145	1050	6.1	4.3
60	2,160	3.6	155	1121	6.5	4.6

Nutrient Requirements of Lactating Ewes (Ranjhan, 1998).

TABLE - 19

BW (kg)	DM (g)	DM (%B.wt)	DCP (g)	TDN (g)	Ca (g)	P (g)
25	1,230	4.9	95	665	6.1	4.1
30	1,410	4.7	108	760	7.0	4.7
35	1,580	4.5	120	855	7.9	5.3
40	1,750	4.4	135	945	8.7	5.8
45	1,910	4.2	150	1030	9.5	6.3
50	2,070	4.1	160	1,120	10.3	6.9
55	2,220	4.0	170	1,200	11.1	7.4
60	2,372	3.9	185	1,280	11.8	7.9

Daily Nutrient Requirements of Growing Kids (Ranjhan, 1998).

TABLE - 20

BW (kg)	ADG (g)	DMI (g)	DM (%BW)	DCP (g)	TDN (g)	Ca (g)	P (g)
10	5	380	3.8	27	265	2.0	1.4
	100	510	5.1	37	355	2.7	1.8
	150	635	6.3	47	445	3.4	2.3
15	50	510	3.4	33	330	2.7	1.8
	100	645	4.3	43	420	3.5	2.3
	150	785	5.2	53	510	4.2	2.8
20	50	640	3.2	39	385	3.3	2.2
	100	790	3.9	49	475	4.1	2.7
	150	985	4.9	59	590	5.1	3.4
25	50	760	3.0	44	440	3.8	2.5
	100	915	3.7	54	530	4.6	3.0
	150	1070	4.3	64	620	5.3	3.6

Daily Nutrient Requirements for Maintenance of Adult Goats (Ranjhan, 1998).

TABLE - 21

BW (kg)	DMI (g)	DM (%BW)	DCP (g)	TDN (g)	Ca (g)	P (g)
15	500	3.3	23	240	1.1	0.7
			6	45		
20	615	3.1	29	295	1.3	0.9
			5	55		
25	730	2.9	34	350	1.6	1.1
			5	50		
30	830	2.8	39	400	1.8	1.2
			5	50	2.1	1.4
35	940	2.7	44	450	2.1	1.4
			4	50		
40	1040	2.6	48	500	2.3	1.5
			5	40		
45	1125	2.5	53	540	2.5	1.7
			4	50		
50	1230	2.4	57	590	2.7	1.8
			5	40		
55	1315	2.4	62	630	2.9	1.9
			4	45		
60	1410	2.3	66	675	3.1	2.1
		0.1-0.2	4-5	45	0.2	0.2

Daily Nutrient Requirements of Pregnant Does (Ranjhan, 1998).

TABLE - 22

BW (kg)	DMI (g)	DM (%BW)	DCP (g)	TDN (g)	Ca (g)	P (g)
15	700	4.7	42	385	2.1	1.4
20	865	4.3	52	475	2.3	1.7
25	1025	4.1	62	564	3.1	2.1
30	1170	3.9	71	645	3.5	2.3
35	1320	3.8	80	725	4.0	2.7
40	1460	3.6	88	802	4.4	2.9
45	1590	3.5	96	875	4.8	3.2
50	1725	3.4	104	984	5.2	3.5
55	1850	3.4	112	1018	5.5	3.7
60	1975	3.6	120	1086	5.9	3.9

Daily Nutrient Requirements of Lactating Does (Ranjhan, 1998).**TABLE - 23**

BW (kg)	MILK yield, (kg)	DMI (g)	DM (%BW)	DCP (g)	TDN (g)	Ca (g)	P (g)
20	0.5	865	4.3	51	468	4.3	2.9
	1.0	1185	5.9	74	640	5.9	3.9
25	0.5	968	3.9	56	523	4.8	3.2
	1.0	1290	5.2	79	695	6.4	4.3
30	0.5	1060	3.5	61	573	5.3	3.5
	1.0	1380	4.6	84	745	6.9	4.6
35	0.5	1155	3.3	66	623	5.8	3.9
	1.0	1470	4.2	89	795	7.3	4.9
40	0.5	1245	3.1	70	673	6.2	4.1
	1.0	1565	3.9	93	845	7.8	5.2
45	0.5	1320	2.9	75	713	6.6	4.4
	1.0	1640	3.6	98	885	8.2	5.3
50	0.5	1410	2.8	79	763	7.0	4.7
	1.0	1730	3.5	1.2	935	8.6	5.7
55	0.5	1490	2.7	84	803	7.4	4.9
	1.0	1805	3.3	1.7	975	9.0	6.0
60	0.5	1570	2.6	88	848	7.8	5.2
	1.0	1890	3.1	111	1020	9.4	6.3

Requirements for Chicken Feeds (BIS 1992)
(on dry matter basis)

TABLE - 24

Sl. Characteristic No.	Requirements for					
	Broiler Starter Feed	Broiler Finisher Feed	Chick Feed	Growing Chicken Feed	Laying Chicken Feed	Breeder Layer Feed
1. Moisture, percent by mass, Max	11	11	11	11	11	11
2. Crude protein (NX 6.25) percent by mass, Min	23	20	20	16	18	18
3. Lysine, percent by mass, Min	1.1	1.0	0.9	0.6	0.65	0.65
4. Methionine, percent by mass, Min	0.50	0.35	0.3	0.25	0.30	0.30
5. Metabolizable energy (Kcal/kg), Min.	2800	2900	2600	2500	2600	2600
6. Crude Fibre, percent by mass, Max	6	6	7	8	8	8
7. Calcium (as ca) Percent by mass, Min	1.2	1.2	1.0	1.0	3.0	3.0
8. Available phosphorus, percent by mass, Min	0.5	0.5	0.5	0.5	0.5	0.5
9. Acid insoluble ash percent by mass, Max	3.0	3.0	4.0	4.0	4.0	4.0
10. Salt (as Nacl) percent by mass, Max	0.6	0.6	0.6	0.6	0.6	0.6
11. Calorie/ Protein Ratio	122	145	130	156	144	144

$$\text{C/P Ratio} = \frac{\text{ME (Kcal/ Kg)}}{\text{Protein\%}} = \frac{2800}{23} = 122$$

**Requirements for Minerals, Fatty Acids, Amino Acids and Vitamins in
Chicken Feeds (BIS 1992)**

TABLE - 25

Sl. Characteristic	Requirements for					
	Broiler Starter Feed	Broiler Finisher Feed	Chick Feed	Growing Chicken Feed	Laying Chicken Feed	Breeder Layer Feed
1. Manganese, mg/kg	90	90	90	50	55	90
2. Iodine, mg/kg	1	1	1	1	1	1
3. Iron, mg/kg	120	120	120	120	75	90
4. Zinc, mg/kg	60	60	60	60	75	100
5. Copper, mg/kg	12	12	12	12	9	12
6. Vitamin A, IU/kg	6000	6000	6000	6000	8000	8000
7. Vitamin D, IU/kg	600	600	600	600	1200	1200
8. Thiamin, mg/kg	5	5	5	5	3	3
9. Riboflavin, mg/kg	6	6	6	6	5	8
10. Pantothenic acid, mg/kg	15	15	15	15	15	15
11. Nicotinic acid, mg/kg	40	40	40	40	15	15
12. Biotin, mg/kg	0.2	0.2	0.2	0.2	0.15	0.20
13. Vitamin B ₁₂ ,mg/kg	0.015	0.015	0.015	0.015	0.01	0.01
14. Folic acid,mg/kg	1.0	1.0	1.0	1.0	0.5	0.5
15. Choline,mg/kg	1400	1000	1300	900	800	800
16. Vitamin E, IU/kg	15	15	15	15	10	15
17. Vitamin K, IU/kg	1.0	1.0	1.0	1.0	1.0	1.0
18. Pyridoxine,mg/kg	5	5	5	5	5	8
19. Linoleic acid,g/100g	1	1	1	1	1	1
20. Methionine+/ cystine,g/100g	0.9	0.7	0.6	0.5	0.55	0.55

Nutrient Requirements of Leghorn Type Chicken as Percentage or Milligrams or Unit per kg Diet (Ranjhan, 1998).

TABLE - 26

Nutrient	Starter 0 -8 weeks	Grower 9 - 20 weeks	Layer Over 20 weeks	Breeder over 20 weeks
Energy (ME Kcal/kg)	2,500	2,500	2,500	2,500
Protein (%)	22	16	18	18
Lysine (%)	0.80	0.60	0.65	0.65
Methionine (%)	0.30	0.25	0.30	0.30
Linoleic acid (%)	1.0	1.0	1.0	1.0
Calcium (%)	1.0	1.0	3.25	3.25
Phosphorus (Available %)	0.4	0.4	0.4	0.4
Sodium Chloride (%)	0.4	0.4	0.4	0.4
Manganese (mg/kg)	80	50	50	80
Zinc (mg/kg)	50	40	60	80
Iron (mg/kg)	80	60	60	80
Iodine (mg/kg)	8	6	6	8
Copper (IU/kg)	0.3	0.3	0.3	0.3
Vitamin A (IU/kg)	4,000	4,000	10,000	10,000
Vitamin D ₃ (IU/kg)	400	400	400	400
Vitamin E (mg/kg)	20	10	10	10
Vitamin K (mg/kg)	1	1	1	1
Thiamin (mg/kg)	4	2	2	2
Riboflavin (mg/kg)	5	3	5	8
Pyridoxine (mg/kg)	4	4	4	6
Pantothenic acid (mg/kg)	15	15	10	15
Nicotinic acid (mg/kg)	35	20	20	20
Folic acid (mg/kg)	1	0.5	0.5	1
Biotin (mg/kg)	0.25	0.15	0.15	0.25
Vitamin B ₁₂ (mg/kg)	0.01	0.005	0.006	0.006
Choline (mg/kg)	1,300	900	1,300	1,300

Source: Requirements for vitamins, amino acids and minerals are adopted from NRC (1994).

**Nutrient Requirements of Briolers as Percentage or Milligrams or
Unit per kg Diet (Ranjhan, 1998).**

TABLE - 27

Nutrient concentration	Starter 0 - 5 weeks	Finisher 6 - 7 weeks	Developer 2 - 20 weeks	Breeder over 20 weeks
Energy (ME Kcal/kg)	2800	2800	2800	2800
Protein (%)	22	20	16	18
Lysine (%)	1.0	0.8	0.6	0.7
Merhionine+Cystine (%)	0.75	0.75	0.75	0.75
Calcium (%)	1.0	1.0	1.0	3.25
Phosphorus (Available. %)	0.5	0.5	0.5	0.5

Some common Sources of Ca and P

TABLE - 28

Source	%Element			Biological availailiy of P%
	Ca	P	F	
Calcite grit	34	-	-	-
Calcium carbonate	38	-	-	-
Limestone, ground	36	-	-	-
Oyster shell	38	-	-	-
Steamed bone meal	29	12.6	0.05	82-100
Monosodium phosphate	-	22.5	-	100
Dicalcium phosphate (DCP)	21	18.5	0.14	85-92
Defluorinated rock phosphate	32	18	0.16	85-95
Tricalcium phosphate	38.7	20	-	72-90
Soft rock phosphate	17	9	1.2	50-65
Phosphoric acid	1	31.6	-	100

A Trace Mineral Mix

Element	mg/kg diet	Salt	mg/kg diet
Zinc	80	ZnO	99.7
Manganese	60	Mn So ₄	164.7
Copper	5	CuSo ₄ , 5H ₂ O	19.69
Iodine	0.5	KIO ₃	0.84
Selenium	0.1	Na ₂ SeO ₃ ,5H ₂ O	0.33
Iron	20.0	FeSo ₄	02.0

A Vitamin Supplement for General Use

	Units/kg diet
Vitamin A, IU	6000
Vitamin D ₃ , IU	1500
Vitamin E, IU	10
Vitamin K, mg	2
Vitamin B ₁₂ , mg	0.01
Choline chloride, mg	1000
Folacin, mg	0.5
Niacin, mg	30
Pantothenic acid, mg	15
Pyridoxine, mg	2
Thiamin, mg	2
Riboflavin, mg	4
Antioxidant, mg	100

Chemical Composition and Nutritive Value of Common Poultry Feeds

TABLE - 29

Ingredients	DM %	ME Kcal/kg	Ca	CF	EE	Ca	P %	Lysine	Methionine
Yellow Maize	89	3340	9	2.2	3.8	0.02	0.28	0.22	0.18
White Jowar	89	3200	10	2.3	2.8	0.03	0.28	0.21	0.16
Bajra	91	2850	11.5	3.5	4.3	0.06	0.33	0.43	0.23
Broken Rice	89	2900	8.5	2.6	1.9	0.08	0.39	0.24	0.16
Wheat	89	3000	10	2.4	1.8	0.05	0.31	0.30	0.16
Ragi	92	2800	9	3.8	1.2	0.25	0.36	0.3	0.18
Oil or Fat	-	8000	-	-	-	-	-	-	-
DORB	91	2200	13.5	14.0	0.6	0.07	1.50	0.6	0.25
Rice Polish	90	3300	12	8	15.1	0.08	1.30	0.50	0.22
Wheat Bran	90	2300	15.7	11	3	0.14	1.15	0.59	0.23
Molasses	74	2300	3.0	-	-	1.10	0.12	-	-
Sunflower Cake	93	1900	27	28	1.1	0.37	1.0	1.13	0.58
SBM	89	2300	45	6.6	0.8	0.29	0.65	2.7	0.65
GNC-SE	92	2400	42	13	1.0	0.2	0.63	1.6	0.45
GNC-Exp.	90	2600	40	13	7.3	0.16	0.56	1.5	0.42
Rapessed Cake	92	2300	35	11	1.4	0.72	1.12	1.7	0.65
Fish Meal	91	2400	42	1.0	5.0	3.73(4)	2.43(2.5)	3.2	1.1
Meat Meal	92	2400	45	8.7	7.1	8.27(8)	4.1(4)	2.5	0.65

Level of Inclusion of Some Common Poultry Feed Ingredients.

TABLE - 30

Feed Ingredient	%
Maize	60
Sorghum white	30-40
Sorghum dark	10-20
Bajra	10-20
Ragi	10-20
Wheat	50
Rice bran	10-20
Deoiled rice bran	10-20
Rice polish	10-30
Wheat bran	10-15
Tapioca meal	5-15
Molasses	0-5
Maize gluten	0-10
Goundnut cake	10-30
Sunflower cake	10-20
Safflower cake	5-15
Mustard cake	0-5
Soybean meal	40
Cottonseed cake (Decorticatted)	1-10
Coconut cake	5-10
Fish meal	5-10
Meat meal	5-10
Blood meal	3
Silkworm-pupae meal	6

Corn Soya Based Broiler Rations.

TABLE - 31

Ingredients	Starter	Finisher
Maize	50	60
Soybean meal	39	31
Rice polish	6.5	3.85
Animal fat	-	1.0
Calcite	1.5	1.3
DCP	2.0	2.0
Salt	0.4	0.4
Methionine	0.15	-
Choline chloride	0.1	0.1
Coccidiostat	0.05	0.05
Trace minerals and vitamins	0.2	0.2
Antibiotic supplement	0.1	0.1
	100	100

Examples of Some Broiler Rations.

TABLE - 32

Ingredients	Starter	Finisher
Maize	30	40
Wheat	20	18
Rice polish	5.0	4
Soybean meal	20	20
GNC-SE	15	-
Sunflower cake	-	5
Animal fat	1.2	2
Fish meal	5	8.5
Dicalcium phosphate (DCP)	1.1	1.0
Calcite	1.8	1.05
Lysine	0.1	-
Methionine	0.15	-
Cocciostat	0.05	0.05
Choline chloride	0.1	0.1
Salt	0.2	-
Trace minerals and vitamins	0.2	0.2
Antibiotic supplement	0.1	0.1
	100	100

Examples of Some Layer Rations.**TABLE - 33**

Ingredients	Chick	Grower	Layer
Maize	10	20	20
Jowar	-	-	30
Broken rice	-	30	-
Bajra	25	-	-
Rice polish	15	-	-
DORB	20	16	15
Wheat bran	-	10	-
Sunflower cake	5	5	10
GNC-SE	-	10	-
Soybean meal	15	-	11
Fish meal	8	7	8
Calcite	1.15	1.55	4.85
Dicalcium phosphate	0.4	-	0.7
Coccidiostat	0.05	0.05	0.05
Trace minerals and vitamins	0.2	0.2	0.2
Choline chloride	0.1	0.1	0.1
Antibioic supplement	0.1	0.1	0.1
	100	100	

**Nutrient Requirements of White Pekin Ducks as Percentages or Units per
kg of Diet (90% DM) (NRC, 1994)**

TABLE - 34

Nutrient	Unit	0 to 2 weeks 2900	2 to 7 weeks 3000	Breeding ducks 2900
		← kcal ME/kg diet →		
Protein and amino acids				
Protein	%	22	16	15
Arginine	%	1.1	1.0	
Isoleucine	%	0.63	0.46	0.38
Leucine	%	1.26	0.91	0.76
Lysine	%	0.90	0.65	0.60
Methionine	%	0.4	0.3	0.27
Methionine+Cystine	%	0.7	0.55	0.50
Tryptophan	%	0.23	0.17	0.14
Valine		0.78	0.56	0.47
Macro-minerals				
Calcium	%	0.65	0.60	2.75
Chloride	%	0.12	0.12	0.12
Nonphytate P	%	0.40	0.30	
Sodium	%	0.15	0.15	0.15
Magnesium	mg	500	500	500
Trace Minerals				
Manganese	mg	50	-	-
Selenium	mg	0.20	-	-
Zinc	mg	60	-	-
Water soluble vitamins				
Niacin	mg	55	55	55
Pantothenic acid	mg	11	11	11
Pyridoxine	mg	2.5	2.5	3.0
Riboflavin	mg	4	4	4

**Body Weight, Feed Consumption and Feed Efficiency
of Japanese Quail (ICAR, 1984)**

TABLE - 35

Age, weeks	Body weight, (g)		Av. feed consumption g/bird/day	Cumulative feed efficiency
	Male	Female		
0	7.4	7.4	-	-
1	22.8	23.4	3	1.33
2	46.3	48.0	8	1.93
3	73.3	77.4	11	2.26
4	90.5	100.6	15	2.93
5	111.9	122.3	17	3.44
6	124.5	151.7	21	4.01
Adult (10-20 weeks)	139.8	170.6	23.8	3.00

Source : Feeding of poultry by B. panda et al; ICAR 1984

**Nutrient Requirements of Swine Allowed Feed Ad libitum (90% DM)
(Adapted from NRC 1988)**

TABLE - 36

Intake and Performance levels	Swine Live Weight (kg)				
	1-5	5-10	10-20	20-50	50-110
Expected wt. gain g/day	200	250	450	700	820
Expected feed intake, g/day	250	460	950	1900	3110
Expected efficiency, feed/gain	1.25	1.84	2.11	2.71	3.79
Metabolizable energy, Kcal/kg	3220	3240	3250	3260	3275
Protein%	24	20	18	15	13
Indispensable amino acids (important only)					
Lysine%	1.40	1.15	0.95	0.75	0.60
Methionine + Cystine %	0.68	0.58	0.48	0.41	0.34
Threonine %	0.80	0.68	0.56	0.848	0.40
Tryptophan %	0.20	0.17	0.14	0.12	0.10
Linoleic acid (%)	0.1	0.1	0.1	0.1	0.1
Requirement (% or amount/kg diet) ^e					
Mineral elements					
Calcium %	0.90	0.80	0.70	0.60	0.50
Phosphorus, total %	0.70	0.65	0.60	0.50	0.40
Available P %	0.55	0.40	0.32	0.23	0.15
Iron, mg	100	100	80	60	40
Copper, mg	6	4	5	4	3
Manganese, mg	4	4	3	2	2
Zinc, mg	100	100	80	60	50
Selenium, mg	0.3	0.3	0.25	0.15	0.10
Vitamins					
Vitamin A, IUI	2200	2200	1750	1300	1300
Vitamin D, IU	220	220	220	150	150
Vitamin E, IU	16	16	11	11	11
Vitamin K, mg	0.5	0.5	0.5	0.5	0.5
Niacin, available, mg	20	15	12.5	10	7
Pantothenic acid, mg	12	10	9	8	7
Riboflavin, mg	4	3.5	3	2.5	2
Vitamin B12, ug	20	17.5	15	10	5

a. The amino acid, minerals and vitamins requirements are based upon the types of ingredients.
 1 to 5 kg pigs, diet has 25 to 75% milk products
 5 to 10 kg pigs, diet has 5 to 25% milk products
 10 to 110 kg pigs, a corn-soyabean meal diet

Nutrient Requirements of Breeding Swine (Adapted from NRC 1988).

TABLE - 37

Intake levels	Bred gilts, sows and adult boars	Lactating gilts and sows
DE, Kcal/kg diet	3,340	3,340
ME, kcal/kg diet	3,210	3,220
CP %	12	13

Requirements of Pig Feeds [IS 7472 : 1986(Clause 3.3)] BIS 1986

TABLE - 38

SI. Charateristic No.	Requirements for		
	Pig Starter/ Creep Feed	Pig Growth Meal	Pig Finishing/ Breeding Meal
1. Moisture content, percent by mass, Max	11.0	11.0	11.0
2. Crude protein (N2 x 6.25), percent by mass, Min	20.0	18.0	16.0
3. Crude fat or ether extract, percent by mass, Min	2.0	2.0	2.0
4. Crude fibre, percent by mass, Max	5.0	6.0	8.0
5. Total ash, percent by mass, Max	8.0	8.0	8.0
6. Acid insoluble ash, percent by mass, Max	4.0	4.0	4.0
7. Metabolizable energy Kcal/kg), Min	3360	3170	3170

Note : The value specified for requirements (2) to (6) are on moisture free basis.

Requirements for Pig Feeds (Clause 3.5) BIS 1986.

TABLE - 40

Sl. Characteristic No.	Requirements for		
	Pig Starter/ Creep Feed	Pig Growth Meal	Pig Finishing/ Breeding Meal
1. Niacin, mg/kg	17	14	10
2. Pantothenic acid, mg/kg	11	10	10
3. Riboflavin, mg/kg	3	2.4	2.2
4. Vitamin B ₁₂ activity, ug/kg	15	11	11
5. Vitamin A, IU/kg	1700	1300	1300
6. Vitamin D, IU/kg	190	180	130

Note : The values specified for requirements (1) to (7) are on moisture free basis.

**RATIONS FOR FEEDING CATTLE & BUFFALOES
DURING - SCARCITY
TABLE - 41**

Components of Ration	Quantity		
	Lactating Cow/Buffalo	Bullock	Calves
1. Straw/ husk/ kadbi (Wheat straw, paddy straw, dried grasses, pulse straw, groundnut husk, Jowar or bajra kadbi etc.) (mixture of 2-3 dry fodders.)	Upto 8 Kg.	upto 8 Kg.	2-7 Kg.
2. Local tree leaves or other green leaves / leaves such as - Banyan, Mango, Neem, Mahua, Jamum, Subabul, Rhea etc.	1 Kg.	1 Kg.	½ Kg.
3. Concentrate mixture (See Table 42)	1 Kg.	½ Kg.	¼ Kg.
4. Mineral mixture	30 g.	30 g.	10-20 g.
5. Urea	30 g.	30 g.	10-20 g.

**CONSTITUENTS OF CONCENTRATE MIXTURES
USED DURING SCARCITY**

TABLE - 42

INGREDIENTS	% COMPOSITION				
	1	2	3	4	5
Wheat Bran	-	20	-	-	-
Rice Polish	-	-	-	15	-
Pulse chunni	-	-	20	10	20
Khesari pulse	-	-	-	10	10
Gram husk	10	-	10	5	-
Babulseed	-	-	10	-	10
Sugar beat Pulp	-	10	-	-	-
Mango Seed Kernel	10	-	10	10	15
Jamun Seed	10	15	-	-	-
Sal seed Cake	10	10	10	10	-
Neem Cake	-	-	-	-	10
Bijada Cake	10	10	-	-	-
Rubber Cake	-	-	-	5	-
Coconut Cake	-	-	-	20	-
Cotton Seed Cake	-	-	-	-	10
Cluster Seed Cake	20	10	-	-	-
Ground Nut Cake	20	10	25	-	10
Molasses	10	15	15	15	15

FEEDING SCHEDULE

Feeding Schedule of calves upto 3 months of age* -

TABLE - 43

Age of calf	Whole Milk	Calf starter ^a (g)	Good Quality ^b hay (g)
1 to 3 days	Colostrum @ 1/10 th of BW in 3 feeds	-	-
4 to 7 days**	Whole milk @ 1/10 th of BW in 3 feeds	-	-
8 to 14 days	Whole milk @ 1/10 th of BW	-	-
15 to 21 days	Whole milk @ 1/10 th of BW	A little	A little
22 to 35 days	Whole milk @ 1/15 th of BW	100 gm	Ad. lib.
up to 2 months	Whole milk @ 1/20 th of BW	250 gm	Ad. lib.
2 to 3 months	Milk gradually reduced and tapered	500 gm	Ad. lib.

* This schedule is satisfactory to produce a daily growth rate of 0.5 Kg in crossbred calves.

** Milk replacer can be given directly after colostrum feeding or after one week of age.

MILK REPLACER

COMPOSITION - 1

Ingredient	Parts
Dried skim milk	50.00
Dried whey	30.00
Dextrose	08.00
Oat flour	05.00
brewer's yeast	05.00
Irradiated yeast	00.26
Trace minerals	00.04
Stabilized Vit A Supplement	01.70
Total	100.00

COMPOSITION - 2

Ingredient	Parts
Wheat flour	10.0
Fish meal	12.0
Linseed meal	40.0
Coconut oil	07.0
Linseed oil	03.0
Butyric acid	0.3
Citric acid	1.4
Molasses	10.0
Mineral mixture	3.0
Auro fac	0.3
Milk	13.0
Total	100.00
Add Rovimix	15 gm.

Developed at NDRI, KARNAL

CALF STARTERA -

COMPOSITION - 1

Ingredient	Parts
Crushed Barley	50
G.N. Cake	30
Fish meal	10
Wheat meal	08
Mineral mixture	02
Total	100.00

DCP - 20 - 30 %

TDN - 70 - 75 %

COMPOSITION - 2

Ingredient	Parts
Crushed Maize	50.0
Til Cake	30.0
Dried skim milk/ meat meal	10.0
Rice meal	08.0
Mineral mixture	02
Total	100.00

DCP - 20 - 30 %

TDN - 70 - 75 %

To 100 Kg of above mixture the following may be added

1. Molasses - 5 - 10 Kg
2. Rovimix (AD3) - 10 gm
3. Salt - 0.5 Kg
4. Aurofac - 20 gm
(Antibiotic)

a. Calf Starter

The constituent of the calf-starter can be altered according to the availability of the feeds in the different regions of India.

Barley - May be completely replaced by Maize and partly by rolled oats, sorghum, Millet grains to rice polishing of good quality.

In place - Linseed oil meal, til cake, decorticated cotton seed cake, of GNC soyabean oil meal etc may be used .

Wheat Bran - Rice bran (There should not be any adulteration of husk)

Fish meal - Meat meal or dried skimmed milk and after 2 months replace with GNC.

b. Roughage

Good quality leguminous hay/ fodder to calves at an easily age has been found to cause early development of rumen functions. All concentrate diets have been found to result in increased acid prod. in rumen and there by may damage the rumen mucosa.

Rations Schedule for calves from 3 to 6 months of age -

TABLE - 44

Ration	I	II	III
<u>Roughage (Kg)</u>	Green maize/ oats/ Silage/alike fodder10-15	Berseem - 1.5 - 2.5 + Dry fodder - 2	Green 2 - 3 + Straw 1 - 2
<u>Concentrate mix (Kg)*</u>			
Hariana	1.0- 1.5	0.75 - 1.0	1.2 - 2.0
Murrah buffalo	1.2 - 1.5	0.90 - 1.5	1.4 - 2.0
Exotic	1.5 - 2.5	-	-

Rations Schedule for calves between 6 to 12 months

TABLE - 44.1

Ration	I	II	III
<u>Roughage (Kg)</u>	Green maize/ oats/ alike fodder (15 - 20)	Berseem - 15 - 20 + Dry fodder - 2	Green 2 - 3 + Straw/ kadbi - 5
<u>Concentrate mix (Kg)*</u>			
Hariana	1.0	1.0	2.0
Murrah buffalo	1.25	1.0	2.0
Exotic	2.0 - 2.5	-	-

**Ration Schedule from 1 year to age of connection (Heifer) -
TABLE - 45**

Ration	I	II	III
Roughage (Kg)	Green maize/ oats 25-35	Berseem - 30 + Dry fodder - 3	Green 4.5 + Straw - 5
Concentrate mix (Kg)* Hariana (130 - 300 kg)	1.5	1.0	2.0
Murrah buffalo (140-300 kg)	2.0	-	-
Exotic & Cross bred (200 - 300 kg)	2.0	1.5	-

* Concentrate mixture -

COMPOSITION - 1

Ingredient	Parts
Mustard cake	38
Barley	40
Wheat bran	19
Mineral mix	02
Salt	01
Total	100.00

COMPOSITION - 2

Ingredient	Parts
Ground nut cake	20
Barley	30
Wheat bran	18
Gram	19
Mineral mix.	02
Salt	01
Total	100.00

COMPOSITION - 3

Ingredient	Parts
Ground nut cake	15
Gingilly oil cake	14
Jowar	20
Maize	22
Deoiled Rice bran	26
Mineral mix.	02
Salt	01
Total	100.00

COMPOSITION - 4

Ingredient	Parts
G.N. cake	15
Gram	38
Maize	40
Gram husk	04
Mineral mixture	02
Salt	01
Total	100.00

DCP and TDN contents in above mixtures vary from 16 - 18 %
and 70 - 75 %

TABLE - 46.

Nutrient requirement for a 200 Kg bull calf -

DM - 5.7 Kg

DCP - 0.33 Kg

TDN - 3.4 Kg

Ingredient	Qty. (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)
Ration - I (Straw + concentrate mixture*)				
Straw (Contain DM- 90%, DCP-0% TDN- 40%)	4.00	3.60	0.00	1.60
Conc. mix. (DM-90%, DCP- 15%, TDN - 75%)	2.50	2.25	0.37	1.87
Total		5.85	0.37	3.47
Ration II- (Straw + Green Grass + Conc. mix*)				
Straw (as above)	4.00	3.60	0	1.6
Green Grass (DM- 25%, DCP-1.5%, TDN- 10%)	2.00	0.50	0.03	0.2
Conc. mix (as above)	2.25	2.02	0.33	1.69
Total		6.12	0.36	3.49
Ration III - (All roughage ration)				
Berseem/ other leguminous fodder (DM- 20%, DCP- 1.5%, TDN- 10%)	30	6.0	0.45	3.0

Composition of concentrate mixture (15% DCP & 75% TDN)-

Ingredient	Parts
Barley / Oat	25
Gingilly oil cake	15
Rice Bran/ Wheat Bran	20
G.N. Cake	30
Gram Chuni	07
Mineral mix.	02
Salt	01
Total	100.00

Maintenance rations for cattle and buffalo (Avg. B.wt. 400 Kg)

TABLE - 47

Ingredient	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)	Ca (gm)	P (gm)	Carotene (mg)
Nutrient requirement		5.5	0.25	3.0	17	13	42
Ration - I Non-maintenance type (Straw) as sole roughage							
Straw (DM- 90%, TDN- 40%, TDN-40%, Ca- 0.2%, P-0.07%)	6.0	5.4	0.00	2.4	12.0	4.0	-
G.N. Cake (90, 40, 75, 0.2, 0.7)	0.8	0.7	0.32	0.6	2.0	5.0	
Total		6.1	0.32	3.0	14.0	9.0	
Ration - II Limited maintenance type fodder							
Green Grass (25, 1, 12, 0.3, 0.2)	10	2.5	0.1	1.2	8	5	
Straw (as above)	5.0	4.5	0	2.2	9	6	
G.N. Cake (as above)	0.35	0.32	0.15	0.25	7	2	
Total		7.32	0.25	3.65	24	13	
Ration - III Maintenance type fodder in desired quantity							
Green maize/ Sorghum/ hybrid napier/ Paragrass/ Guniea Grass (25, 1, 12, 0.07, 0.04)	25	6.25	0.25	3.0	18	10	
Ration - IV Maintenance and productive type fodder are available in limited quantity.							
Green Grass (as above)	10	2.5	0.1	1.2	8	5	
Leguminous Fodder (15, 2.5, 10, 0.3, 0.05)	6	0.9	0.15	0.6	18	3	
Straw (as above)	3	2.7	0	1.3	6	2	
Total		6.1	0.25	3.1	3.2	10	
Ration - V Productive type fodder in desired quantity							
Green Legumes (Berseem/ Cowpea)	8	1.6	0.24	0.96	24	6	
Straw	5.5	4.9	0.00	2.2	11	3	
Total		6.5	0.24	3.16	35	9	

Ration for lactating Cattle/ Buffalo

(A)- Adult Cow weighing 400 Kg producing 5 Kg milk daily with 4% Fat-

TABLE - 48

Feed/ Fodder	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)	Ca (gm)	P (gm)	Carotene (mg)
Nutrient req. for Maint.	-	5.50	0.250	3.00	17	13	42
for production	-	2.5	0.225	1.58	14	10	-
Total requirement	-	8.00	0.475	4.58	31	23	42
Ration- I Non-maintenance type straw/ dry nature grass as sale roughage							
Straw/ dry nature grass (90, 0, 40, 0.2, 0.07)	6	5.4	0	2.40	12	4.2	
Concentrate mix (90, 15, 75)	3.5	3.15	0.472	2.36	7	17.5	
Total		8.55	0.472	4.76	19	21.7	
Ration - II Maintenance type roughage available							
Green maize/ Jowar/ green grass (25, 1.0, 15, 0.3, 0.2)	22	5.5	0.22	3.3			
Conc. Mix. (90, 15, 75)	2.0	1.8	0.3	1.5			
Total		7.3	0.52	4.8			
Ration - III Productive type roughage available							
Berseem/ Lucerne/ Cow Pea (20, 2, 12, 0.3, 0.05)	10	2.00	0.2	1.44			
Wheat Straw (90, 0, 40)	5.5	4.95	0	1.98			
Conc. Mix. (90, 15, 75)	2.0	1.80	0.27	1.35			
Total		8.75	0.47	4.77			

* Nutritive value of feeds is given in paranthesis as (DM%, DCP%, TDN%, Ca%, P%)

* Nutritive value in dry roughage and in conc. mix is on DM basis.

* Nutritive value in Green Fodder is as such basis.

* Conc. mix contain 2 g Ca and 5 gm P per Kg.

**B. - Adult cow weighing 400 Kg, Producing 10 Kg milk with 4% Fat -
TABLE - 48.1**

Feed/ Fodder	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)	Ca (gm)	P (gm)	Carotene (mg)
NR for maintenance		5.5	0.25	3.0	17	13	42
For Production			0.45	3.15	27	20	-
Total requirement		10*	0.7	6.15	44	33	
* DM requirement is calculate as 2.5% of B.wt.							
Ration- I When non-maintenance type roughage available							
Straw/ dried nature grass	6	5.4	0	2.4			
Conc. mixture (90, 15, 75)	5.5	4.95	0.74	3.71			
Total	10.35	0.74	6.11				
Ration- II When maintenance type roughage is available							
Green maize/ Jowar/ green grass	22	5.5	0.22	3.30			
Conc. mixture (90, 15, 75)	4	3.60	0.54	2.70			
Total		9.10	0.74	6.0			
Ration- III When productive type fodder is available							
Berseem/ Lucerne/ cowpea	10	2.00	0.20	1.44			
Wheat Straw	5.5	4.95	0.00	1.98			
Conc. mixture (90, 15, 75)	4.0	3.60	0.54	2.70			
Total		10.55	0.74	6.12			

C. - Adult cow weighing 400 Kg, Producing 15 Kg milk with 4% Fat -

TABLE - 48.2

Feed/ Fodder	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)	Ca (gm)	P (gm)	Carotene (mg)
NR for maintenance		5.5	0.25	3.0	17	13	42
For Production			0.675	4.73	41	30	-
Total requirement		12	0.925	7.73	58	43	42
* DM requirement is calculate as 3% of B.wt.							
Ration- I When non-maintenance type fodder is available							
Straw/ nature grass	7.00	6.30	0.000	2.52			
Conc. mixture (90, 15, 75)	6.75	6.07	0.911	4.55			
Total		12.37	0.911	7.07			
Ration- II When maintenance type fodder is available							
Green maize/ Jowar/ green grass	25	6.25	0.25	3.75			
Conc. mixture (90, 15, 75)	5.5	4.95	0.74	3.71			
Total		11.20	0.99	7.46			
Ration- III When productive type fodder is available							
Berseem/ Lucerne/ cowpea	10.0	2.00	0.20	1.44			
Wheat Straw	5.5	4.95	0	1.98			
Conc. mixture (90, 15, 75)	5.5	4.95	0.74	3.71			
Total		12.35	0.94	7.13			

Note : For growing lactating cow nutrient requirement for growth were also taken into consideration for calculating the nutrient requirement and accordingly the quantity of feeds were adjusted to fulfil the requirement.

Ration for pregnant Cattle/buffalo during last two month of gestation (Weighing 400 Kg)

TABLE - 49.

Feed/ Fodder	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)	Ca (gm)	P (gm)	Carotene (mg)
Nutrient requirement		7.2	0.35	4	23	18	76
Ration- I When non-maintenance type fodder is available							
Wheat Straw (90, 0, 40)	5	4.50	0.00	1.89			
Conc. mixture (90, 12, 70)	3.2	2.9	0.35	2.03			
Total		7.4	0.35	3.92			
Ration- II When maintenance type fodder is available							
Green maize/ Jowar/ green grass	22.00	5.5	0.20	3.30			
Conc. mixture (90, 15, 75)	1.40	1.25	0.15	0.875			
Total		6.75	0.35	4.175			
Ration- III When productive type roughage is available							
Berseem/ Lucerne	10	2.00	0.20	1.44			
Wheat Straw	4.0	3.6	0	1.44			
Conc. mixture	1.40	1.25	0.15	0.875			
Total		6.85	0.35	3.755			

**Ration for working bullock
Table - 50.**

A. Normal work -

	Feed/ Fodder	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)
(i) Weighing 300 Kg	Nutrient requirement		6.30	0.33	3.10
	Straw (90, 0, 42)	3.90	3.50	0.00	1.47
	Conc. mix. (90, 12, 70)	3.10	2.80	0.34	1.96
	Total	7.00	6.30	0.34	3.43
(ii) Weighing 400 Kg	Nutrient requirement		7.6	0.45	4.0
	Wheat Straw (90, 0, 42)	6.00	5.40	0.00	2.30
	Cotton Seed cake decorticated extraction (90, 32, 75)	1.5	1.35	0.43	1.0
	Maize (90, 8, 80)	1	0.9	0.05	0.72
	Total	8.5	7.65	0.48	4.02

A. Heavy work -

(i) Billock weighing 300 Kg

Feed/ Fodder	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)
Nutrient requirement			0.42	4.0
Wheat Straw (90, 0, 42)	4.45	4.0	0.00	1.68
Conc. mix. (90, 12, 70)	3.90	3.50	0.42	2.45
Total	8.35	7.50	0.42	4.13
(ii) Bullock weighing 400 Kg				
Nutrient requirement			0.57	4.8
Wheat Straw (90, 0, 42)	7.80	7.00	0.00	2.94
Cotton Seed cake decorticated extraction (90, 32, 75)	1.7	1.50	0.48	1.13
Maize (90, 8, 80)	1.10	1.00	0.08	0.80
Total	10.60	9.50	0.56	4.87

Ration for breeding bull, weighing 500 Kg -

TABLE - 51

Feed/ Fodder	RM (Kg)	DM (Kg)	DCP (Kg)	TDN (Kg)	Ca (gm)	P (gm)	Carotene (mg)
Nutrient requirement			0.45	4.5	20	15	53
Ration- I When roughage is maintenance type -							
Wheat Straw (90, 0, 40)	4.45	4.0	0	1.68			
Conc. mixture	4.16	3.75	0.45	2.81			
Total		7.75	0.45	4.49			
Ration- II When green fodder is available							
Maize fodder	20.00	5.00	0.20	3.00			
Wheat Straw	2.00	1.8	0.00	0.72			
Conc. mix.	2.25	2.0	0.24	1.40			
Total		9.15	0.44	5.12			

NUTRIENT REQUIREMENT AND FEEDING SCHEDULE OF GOATS

Feeding of goat for meat production.

Feeding schedule for kids up to weaning (birth to 90 days)

TABLE - 52

Age of Kid	Dam's milk or cow milk (ml)	Starter/ Creep feed* (gm)	Good qual. green forage/ legume hay (gm)
1 to 3 days	Colostrum 300 ml (in 3 feeding)	-	-
4 to 14 days	350 ml (in 3 feeding)	-	-
15 to 30 days	350 ml (in 3 feeding)	A little	A little
31 to 60 days	400 ml (in 2 feeding)	100 - 150	Free choice
61 to 90 days	200 ml (in 2 feeding)	200 - 250	Free choice

**Composition of Starter/ creep feeds -
Table - 52.1.**

Particulars/ Rations	Feed ingredient %						
	1	2	3	4	5	6	7
Maize	60	40	20	15	-	25	30
Barley loat	-	20	45	40	40	40	30
G. N. Cake	20	20	20	20	22	10	10
Fish meal	10	10	10	10	10	10	10
Molasses	-	-	-	10	20	-	10
Wheat bran	7	7	2	2	5	12	7
Mineral mix.	2	2	2	2	2	2	2
Salt	1	1	1	1	1	1	1
Total	100	100	100	100	100	100	100
Calculated values :	← Type - I →			← Type - II →			
DCP %	18	17	17	17	17	12	12
TDN %	78	77	75	71	70	72	70

To 100 Kg of above mixture add :

- (a) 150 gm TM-5 or Auofac
- (b) 25 gm Vitablend/ Rovimix or 1 tea spoon full of sharkliver oil per kid per day.

- Note :**
1. G. N. Cake may be replaced by linseed cake, sesame cake, kusum cake or Mustard cake on equal nitrogen basis.
 2. Jowar, Bajra and Ragi may be used to substitute ard cereal parts.
 3. Rice bran, small millets like sawan, kodo and kadni may be used to replace wheat bran on W/W basis.
 4. Two types of creep mixtures can be offered depend on type of roughage
 Type I- (DCP- 17-18%, TDN- 70-75%) - When grasses/ cereal fodder are available
 Type II- (DCP- 12%, TDN- 70-72%) - When leguminous fodder are available

Grower Ration -

A complete ration providing 9 - 10% DCP and 62 - 65% TDN with 20 to 25% DM from good quality roughage will meet the requirements. Fodders containing less protein and energy are to be balanced with the concentrate mixtures given in following table.

**Composition of Grower mixtures -
TABLE - 53.**

Rations	% feed ingredients			
	1	2	3	4
Maize	50	-	30	22
Dal Chunies	-	-	30	35
Dats/ Barley	-	50	30	-
Wheat Bran	30	20	-	30
G. N. Cake	10	10	-	5
Molasses	7	17	7	5
Mineral Mix.	2	2	2	2
Salt	1	1	1	1
Total	100	100	100	100

- Note :**
1. Maize can be substitute with jowar and rice polish.
 2. Dal chunies may be replaced with leguminous seeds like pea, gram, lobia etc. Akra may also be used.

Finisher Ration -

A complete ration providing 5 - 6 % DCP and 60 - 65 % TDN is quite satisfactory for finishing period.

Example : Feeding on tree leaves, shrubs, creeper, grasses, cereal fodder, pulse chunies can supply desired DCP and TDN.

It is generally recommended that 20 - 25 % and 30 - 40% of total DM requirement should be met through roughages for fatty finish and lean carcass production respectively.

Feeding of replacement flock -

Feeding of replacement flock is so adjusted that sexual maturity and body size are achieved at about one year of age that is 15 - 20 Kg live weight in small breeds and 20 - 25 Kg in large breeds.

After weaning at 8 to 10 Kg B.wt. the following feeding schedule may be adopted -

1. Good quality pasture and browsing conditions - No supplemented conc. mixture is required.
2. During lean periods - Supplementation of 0.25 to 0.5 Kg concentrate mixture containing 12 % DCP and 68 - 70% TDN may be required.

Feeding of dry pregnant goats -

A balanced ration containing 5 - 6 % DCP and 55 - 60 % TDN will be quite satisfactory.

- Examples -**
1. Feeding of good quality fodders like tree leaves or grasses or pulse churies + free choice lick of min. mixture.
 2. Good pasture / Browsing + 200 gm conc. mix.
 3. In milch breeds good pasture / browsing + concentrate mix. (30% of DM requirement).

Feeding of lactating pregnant goats -

A ration providing 5 - 6 % DCP and 55 - 60 % TDN would be quite satisfactory. Therefore the feeding schedule may be similar to dry pregnant goat.

Feeding of lactating goats -

The daily feed requirement is about 4 to 4.5 % during first half and 3 to 4% of body weight in later half of lactation period. A ration supplying 5 - 6 % DCP and 55 - 60 % TDN with sufficient minerals and vitamins is quite good for maintaining 1 Kg of milk.

Feeding of bucks -

Feeding of bucks should be at a rate of 3 to 3.5 % of live weight. Ration providing 4 to 6 % DCP and 50 - 60 % TDN with sufficient mineral and vitamins will maintain normal health and fertility.

Common feeds and fodder for goats -

1. Tree leaves, shrubs, herbs and creepers viz Paker, Gular, pipal, Beri, Jharberi, Neem Karonda, Bhimal, Ghiabati, Gokhru Morara etc.
2. Grasses e.g. Dub, Motha, Jarga, Bluepanic, Anjan, Sawai, Kankauwa etc.
3. Vegetable wastes viz- Tops of carrot, Turnip, Raddish, leaves of cauliflower, cabbage, mustard and empty pods of peas.
4. Cultivated fodders and their hays
 - (a) Leguminous - Peas, Cowpea, Berseem, Lucerne etc.
 - (b) Cereals - Maize, Oats, Jowar etc.
5. Pods and berries of Babul, Gular, Jharberi, Pakar, Bergod etc.
6. Dry feeds - Dry pods of juliflora, Subaboal, cereal straw, leguminous straw, gram husk, gram waste.

NUTRIENT REQUIREMENT AND FEEDING SCHEDULE OF SHEEP -

Feeding of pre weaned lambs -

Upto 12 weeks of age lambs suckling the mother should be supplemented with creep mixture.

Creep mixture -

TABLE - 56.

Ingredient	% Composition of mixture		
	1	2	3
Maize Flour	67	50	30
Barley Flour	-	17	-
Oat Flour	-	-	37
Ground nut cake	10	10	10
Wheat bran	10	10	-
Rice polish	-	-	10
Fish meal	10	10	-
Meat meal	-	-	10
Mineral mixture	2	2	2
Common Salt	1	1	1
Total	100	100	100

Feeding of growing and finishing lambs (Nature) -

TABLE - 57.

The quantity of supplemental concentrate mixture depend upon the quality of fodder available for feeding.

B. Wt. (Kg)	Quantity of concentrate mix* (gm/ day)	
	When good quality fodders are available ad. lib. (e.g. green oat, cowpea, maize, Dub and their hays)	When poor quality fodders are available ad. lib. (e.g. mature grasses, straws, stover etc.)
10 to 15	50	300
16 to 25	100	400
26 to 35	150	600

* Composition of concentrate mixture -

Ingredient	Parts	Ingredient	Parts	Ingredient	Parts
Maize	25	Maize	25	Maize	30
Wheat bran	40	Wheat bran	32	DORB	40
G. N. Cake	32	G. N. Cake	15	G. N. Cake	20
Min. Mix.	2	Gram Waste		Molasses	08
Salt	1	Min. Mix.	25	Min. Mix.	01
		Salt	1	Salt	01
Total	100	Total	100	Total	100

Feeding of adult sheep -

Availability of fodder	Conc. mix (g/ d)
1. Good quality fodders e.g. cowpea, lucerne, berseem etc are available ad. lib.	Nil
2. Maintenance type fodders e.g. Oat hay, club grass, maize etc. are available	100
3. Non maintenance type fodders eg straw and stoves etc are available	400

Note : Little straw must be provided with good quality fodder as to prevent disorders.

Feeding of breeding Rams and breeding Ewes (Last 6 weeks of gestation) -

- (a) Stall fed (Intensive system) - Feeding ad. lib. green feeds like maize cowpea, dub grass in green or hay form would meet the requirements without supplementing concentrates. However when inferior quality roughage and stovers are available concentrate will have to be supplemented, about 400 gm conc. mix. (DCP- 18%, TDN- 70%) as shown in the following text.
- (b) Semirange condition - The roughage part will be taken care by the usual grazing. During learn periods 150 gm of concentrate mixture may be fed along with the mineral mixture.

Feeding of lactating sheep -

- (a) First 10 days- legume hay ad. lib.
- (b) 10th day of meaning - 250 gm concentrate mix to addition with ad. lib. legume hay upto 2 months after maintenance allowance is sufficient.

Flushing -

Special feeding providing 25% more nutrients above the maintenance needs has to be given 2-3 weeks prior to breeding and continues into the breeding, season is known as flushing ration. It is given to increase ovulation rate and subsequently lambing rate.

Flushing ration consist of
good quality roughage + 200 gm conc. mix.
(Oat, dub, cowpea etc).