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Contents

- 1. Chemical composition of Plants / Feedstuffs*
- 2. Factors affecting Chemical composition of plants*
- 3. Chemical composition of Animal body*



Feeding Practices in Indian Context

- *Traditional feeding practices*
- *Lack of knowledge of balanced feedings*
- *Economic factor*
- *Availability of feedstuffs*
- *Huge transportation cost*



*Feed cost
65-70%*

And therefore-

- *Low productivity*
- *Lower average live weight gain*
- *Delayed maturity*
- *Low conception rate*
- *Long gestation period for investment*

*And thus underlines the Importance of
BALANCED RATION or STRATEGIC NUTRITION*

Performance Comparison of Indian & Exotic Animals:

- Milk yield 900-1200 liter/animal/lactation

Vs.

5000 liter/animal/lactation (Exotic Breeds)

- Live weight gains (calves) 100 to 500 g/head/day

Vs.

800-1000 g/head/day (Exotic Breeds)

Lower performance of Indian breeds is basically due to:

- ✓ Poor plane of nutrition

- ✓ Poor health coverage and prevention measures

- ✓ Non-adaptability of scientific feeding & management practices

Plants Composition

Plants consists of Water/Moisture (75%-80%) & Dry Matter (0-25%). The DM is crucial to composition of a ration. More food is needed when it contains more water. The main components of a feedstuffs are:

- A. Water / Moisture
- B. Dry matter

Dry Matter (DM) consists of

1. Organic Matter (OM) consists of
 - Nitrogenous compounds = Crude Proteins (CP)
 - Nitrogen-free compounds Energy (CHO,EE/Fat)
 - Undesirable substances
2. Inorganic Matter (IOM) composed of Minerals
 - Major Minerals
 - Minor Minerals
3. Vitamins
 - Fat soluble vitamins
 - Water soluble vitamins

A. Water / Moisture

Examples of feeds with high water young grass (85%) & cabbage (90%).

Hay and concentrates has low water contents (10-15%).

Sources of water:

1. Drinking water,
2. Water present in food
3. Metabolic water

Metabolic Water formed during metabolism by oxidation of hydrogen (H) containing organic nutrients.

Water leaves the body with urine, faeces, milk, and as vapour via the lungs (respiration) and the skin (perspiration).

Dairy cattle require water for:

1. Chewing and swallowing (saliva)
2. Transport of nutrients around the body
3. Formation and maintenance of tissues
4. Disposal of waste products
5. Regulation of the body temperature
6. Milk production

Water Requirement of Dairy Animals

- ✓ Access to clean drinking water 24 hrs/day. Cattle spend 15-30 min. on water
- ✓ Water has positive influence on milk production (87% water in milk)
- ✓ ONLY water that we would drink yourself is good enough for cattle

Dairy Cattle Type	Milk Production (kg milk/day)	Water Requirement (Lit/day)
Dairy calves (1-4 months)	-	5-10
Dairy heifers (5-24 months)	-	15-30
Milking cows	10-12	70-83
	20-22	87-102
	30-35	114-136
	35-45	132-150
Dry cows	-	35-50



Water Accessible for 3-4 cows in free-stall



Water Requirement of Goat / Sheep

- ✓ Goat's / Sheep's require less water, as they withstand in hot & humid weather conditions for longer duration.
- ✓ Generally goats requires 150 ml/kg body weight....daily.
E.g. 40 kg BW Goat requires 5-6 litres of water/day.
- ✓ Additionally 1.5 litres extra water for each kg milk produced.
- ✓ They do not drink smelly (foul) and used water.
- ✓ In day time 4 times more water required than night time.
- ✓ DMI: Water ratio=1 kg : 4-5 litres.

B. Dry Matter (DM)

The DM% possible to calculate how many kg DM an animal obtains from the feedstuff (and how many kg concentrate is needed as a supplement according to the norms for the production level).

The DM of a feedstuff can be divided into two groups:

- 1. Organic Matter (OM)**
 - Nitrogenous compounds = Crude Protein (CP)
 - Nitrogen-free compounds = Energy(CHO,EE / Fat)
 - Undesirable substances = ANF's
 - Vitamins = Vitamin B and Vitamin C

- 2. Inorganic Matter (IOM)** composed of Minerals
 - Major Minerals
 - Minor Minerals

1. Organic Matter (OM)

a. **Nitrogenous compounds** = Crude Protein (CP)
= True Protein- Degradable and Undegradable

e.g. Crude Proteins (CP)

Building blocks needed for growth, maintenance, reproduction and lactation. effects due to shortage of protein are:

1. Young stock (retarded growth).
2. Low milk production
3. Less protein in the milk
4. Loss of body weight in (early) lactation
5. Increased risk of infections and metabolic diseases
6. Low fertility rate

b. Nitrogen-free compounds = Energy

- Lipids (EE) + Vit. A,D,E,K
- Carbohydrate
 - Sugars, Starches (NFE)
 - Cellulose
 - Lignin (CF)

c. ANF's – Tannins, saponins,

d. Vitamins – Vitamin B-complex, Vitamin C

2. Inorganic Matter (IOM)

composed of Minerals

- Major Minerals (Na, Ca, P, Cl, K, S, Mg)
- Minor Minerals(I, Mn, F, Co, B, Zn, Fe, Cu, M)

Commonly available fodder crops /AIBP

COMMON GREEN FODDERS:

FEED STUFF	CP	EE	CF	NFE	ASH	INSOL ASH	Ca	P
Berseem	18.60	2.90	20.10	47.16	11.24	2.00	1.50	0.40
Bajara fodder	8.80	2.30	31.50	43.40	14.00	4.40	0.69	0.31
Jowar (Sorghum)	4.80	1.00	34.30	51.80	8.10	3.20	0.42	0.17
Lucerne	19.90	2.90	22.90	43.40	10.90	0.80	1.59	0.43
Guinea grass	9.90	1.90	34.00	40.50	13.70	5.90	0.66	0.27
Maize	5.10	1.50	26.90	59.20	7.30	4.40	0.49	0.19
Napier hybrid	7.40	2.30	21.80	48.50	20.00	9.90	0.31	0.18
Napier grass	13.40	3.40	23.10	44.50	15.60	5.10	0.46	0.37

CEREAL STRAWS:

FEED STUFF	CP	EE	CF	NFE	ASH	INSOL ASH	Ca	P
Bajra	2.40	0.90	44.60	44.30	7.80	2.40	0.44	0.32
Jowar	4.70	1.50	38.00	48.10	7.70	4.30	0.55	0.25
Maize	4.20	2.00	28.40	53.70	11.70	4.70	1.06	0.15
Paddy	4.70	2.00	30.20	46.00	17.10	12.00	0.45	0.22
Wheat	3.20	1.40	37.00	45.60	12.80	8.90	0.34	0.15

OIL SEEDS & CAKES:

Cotton	19.50	18.30	19.80	36.80	5.60	1.10	0.24	0.64
Sarson	21.80	37.30	6.90	21.70	12.30	2.94	0.54	0.65
Sesamum (til)	19.70	51.50	1.60	21.40	5.80	1.30	0.81	0.50
Soybean	38.00	18.00	5.00	34.40	4.60	0.90	0.25	0.59
Groundnut	43.10	7.60	13.90	30.20	5.20	2.10	0.18	0.82
Karanj	28.30	3.70	5.90	57.60	4.50	1.09	0.62	0.58
Linseed	32.50	10.00	15.40	35.20	6.90	1.40	0.66	0.67
Mahua	16.00	10.90	3.10	64.30	5.70	1.10	0.12	0.32
Neem seed	25.30	3.20	21.90	39.00	10.60	3.86	0.18	0.86
Niger	37.90	4.60	18.10	30.30	9.10	2.73	0.09	0.82

UNCONVENTIONAL SEEDS:

FEED STUFFS	CP	EE	CF	NFE	ASH	INSOL ASH	Ca	P
Mahua	16.00	10.90	3.10	64.30	5.70	1.10	0.12	0.32
Orange peels	1.00	9.10	8.90	75.60	5.40	1.00	1.12	0.72
Sea weeds	10.50	0.40	4.80	41.60	42.70	8.80	1.96	0.17
Tamarind	34.90	0.90	11.10	50.20	2.90	0.43	0.30	0.21
Watermelon	20.60	9.90	30.20	35.20	4.10	1.40	0.14	0.40

BY-PRODUCTS:

Gram chuni	16.30	5.00	14.80	57.40	6.50	1.80	0.05	0.27
Guar chuni	34.00	5.30	4.50	51.20	5.00	0.20	0.48	0.29
Masur chuni	23.80	1.80	9.70	49.50	15.20	9.30	1.18	0.38
Mung chuni	22.90	2.80	13.70	52.70	7.90	3.10	0.39	0.28
Tur chuni	16.20	4.20	16.70	56.50	6.40	1.90	0.74	0.36
Udid chuni	16.80	2.60	9.60	57.60	13.40	7.30	0.76	0.28
Wal chuni	31.90	3.40	10.80	31.40	22.50	4.70	0.55	0.51

HUSKS:

Bajri	4.90	0.90	29.80	54.00	10.40	6.90	0.52	0.27
Gram	2.70	0.70	49.80	42.60	4.20	0.40	1.05	0.04
Groundnut	5.80	1.40	55.60	30.90	6.30	2.20	0.24	0.07
Rice	1.20	0.40	46.20	26.00	26.20	25.00	0.06	0.30
Tur	5.50	2.10	39.50	48.60	4.30	0.20	1.10	0.19
Wheat	6.80	1.70	27.80	46.00	17.70	15.00	0.38	0.26

POLISHINGS AND BRANS:

	CP	EE	CF	NFE	ASH	INSOL ASH	Ca	P
Warai/bhagar bran	8.60	5.60	34.30	36.50	15.00	9.89	0.17	0.34
Rice bran	10.40	7.50	22.60	38.00	21.50	15.10	0.19	0.38
Rice kuski	7.10	5.60	25.10	42.70	19.50	15.80	0.20	0.72
Rice polishings	11.60	16.90	2.10	57.60	11.80	5.30	0.16	1.59
Tur polish	24.00	5.80	2.80	62.90	4.50	0.60	0.25	0.35
Wheat bran	14.80	3.20	11.10	62.50	8.40	0.10	0.17	1.47

MEALS:

Blood meal	86.20	0.60	0.60	6.60	6.00	0.10	1.17	1.12
Feather meal	80.00	2.30	2.20	7.40	8.10	2.30	1.20	0.40
Fish meal	41.30	7.80	3.30	14.70	32.90	8.67	3.42	5.36
Guar meal	40.10	5.00	5.50	42.80	6.60	1.70	0.34	0.61
Liver residue meal	74.10	7.10	0.40	13.60	4.80	1.40	1.64	0.08
Meat meal	55.30	6.10	2.50	3.30	32.80	16.30	7.60	4.00
Salseed meal	9.50	6.40	4.20	75.20	4.70	0.89	0.12	0.20
Silkworm pupae	73.50	3.70	3.90	1.30	17.60	10.30	1.24	0.24

MISCELLANEOUS CONCENTRATES:

Babool pods	13.10	2.30	12.30	67.00	5.30	3.40	1.09	0.28
Maize cobs	2.10	0.80	36.40	57.90	2.80	0.60	0.05	0.06
Maize gluten (55%)	55.00	5.30	1.10	36.90	1.70	1.20	0.16	0.30
Maize gluten (45%)	48.90	3.80	1.00	44.80	1.50	0.40	0.29	0.26
Maize gluten (35%)	36.10	4.30	2.90	55.20	1.50	1.80	0.12	0.18
Milk powder (skimmed)	36.90	0.20	0.00	54.10	8.80	0.20	1.55	1.32
Rice polish (deoiled)	15.50	5.10	5.50	60.80	13.10	3.60	0.20	0.55
Shevri pods	7.80	0.50	10.00	75.50	6.20	1.70	1.37	0.37
Tapioca flour	2.90	0.40	10.90	76.30	9.50	6.40	0.59	0.12
Molasses	5.30	1.90	0.00	79.80	13.00	3.89	1.00	0.11

Factors Affecting Chemical Composition of Forages

- 1. Soil composition:** if deficient in Cu, Iron, Iodine---fodders deficient in same trace minerals. If excess e.g. Se, F—Toxic.
- 2. Application of manures and fertilizers:** Nitrogenous fertilizers, superphosphate increases N_2 and P in soil & plants.
- 3. Irrigation:** Increases Ca in soil and plants.
- 4. Stage of growth:** Higher nutritive value just before flowering, goes down at bloom stages.
- 5. Frequency of forage cutting:** increases nutritive value.
- 6. Varieties and strains:** Difference in same species of forage.

Composition of Animal Body (%)

Species	Water (%)	Protein (%)	Fat (%)	Ash (%)
Sheep, Thin	74	16	5	4.4
Sheep, Fat	40	11	46	2.8
Pig, 8kg	73	17	6	3.4
Pig, 30 kg	60	13	24	2.5
Pig, 100 kg	49	12	36	2.6
Cattle	72	13	6	3.2
Buffalo	75	15	8	3.5
Goat	72	16	6	3
Poultry	75	18	4.5	6
Human	60	18	18	4.3

Important facts about Chemical Composition of Plants & Animals

Plants

1. Water content
2. Leaves content
3. Mature plant content
4. Legumes
5. Seeds: low in Ca and high in P
6. Cereal grains : low in Ca & Na

Animals

Water : Protein : Ash Ratio=
74-76% : 20-22% : 3-5%

THANK YOU

