NUTRIENT REQUIREMENT OF SHEEP

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INTRODUCTION

- Sheep rearing plays an important role in livelihood of small, marginal farmers especially in hilly regions of India, where crop farming is difficult.
- Sheep in India are mostly maintained on natural vegetation.
- There are 40 breeds of sheep in India
- The present sheep population in India is about 55 million.
- Inspite of wool and meat, sheep skins and manure are also obtained.
- Hence to obtain more wool from sheep, care should be taken regarding their balanced feeding on a scientific line.

COMPARITIVE FEEDING BEHAVIOUR AND DIGESTIVE PHYSIOLOGY IN GOATS AND SHEEP

S.No.	Characteristics	Goats	Sheep
1	Activity	Walk longer distances	Walk shorter distances
2	Feeding pattern	Browser, more selective	Grazer, less selective
3	Browse and tree leaves	Relished	Less relished
4	Variety in feeds	Preference greater	Preference lesser
5	Taste sensation	More discerning	Less discerning
6	Salivary secretion rate	Greater	Lesser
7	Recycling of urea in saliva	Greater	Lesser
8	Dry matter Intake for meat	3% of BW	3% of BW
9	Dry matter Intake for lactation	4 - 6 % of BW	3% of BW
10	Digestive efficiency with coarse roughages	Higher	Less efficient
11	Retention time	Longer	Shorter
12	Water Intake /Unit DMI	Lower	Higher
14	Water economy Nature of faeces Nature of urine	More efficient Less water More concentrated	Less efficient Relatively higher Less concentrated

WATER AND DRY MATTER REQUIREMENT OF SHEEP

Water requirement of sheep

- Water requirement increases during **growth, gestation, lactation and heat stress**, when **salt content** of diet is more or when animals are made to **travel long distances**.
- Normally a sheep will drink water approx. **2-3 lit./kg dry feed** consumed.

Dry matter requirement of sheep

- In general a adult sheep consumes **2.5 to 3% DM of their live weight**.
- However for a satisfactory growth, lambs require DM of about 4-5% of the body weight.

PROTEIN REQUIREMENTS FOR SHEEP

- Sheep can convert NPN substances into good quality microbial protein.
- **Methionine is 1st limiting AA** in microbial protein.
- When NPN substances are used in sheep ration, the N:S ratio should be maintained as 10:1.
- Level of **10% protein** in ration is adequate for **wool production**.
- Wool is very rich in **cystine and methionine**.
- **Blood meal** is rich in cystine.
- Approx. daily DCP requirement for maintenance is 1/10th of the TDN or **1 gm for every 1 kg of body weight**.
- Requirement increases by about **50%** during pregnancy and **100%** during lactation and growth.

ENERGY REQUIREMENT

- Good roughage alone supply sufficient TDN for breeding ewes.
- Pregnant ewes should fed concentrate.
- During pregnancy ability to use roughage is reduced
- TDN requirement of lambs is higher than that of adult sheep similarly the pregnant, lactating and breeding ewes require more energy than non-pregnant and non lactating ewes.
- As a thumb rule a non-pregnant, non-lactating ewe requires **10 gm TDN per kg live weight** for maintenance and wool production.
- Requirement will be **50% more at last 6 wks of pregnancy** and **100% more at first 10 wks of lactation**.
- Energy deficiency: **Reproductive failure, poor growth and loss in body weight** and may ultimately lead to death.

FACTORS AFFECTING ENERGY REQUIREMENTS

- **Size, age, growth, pregnancy, lactation**.
- **Environment:-** Temperature, Humidity and wind may increase or decrease energy needs.
- Shearing decreases insulation and may increase energy losses.
- Stress of any kind appears to increase energy requirements.

MINERALS AND VITAMINS REQUIREMENT OF SHEEP

- Only **15 minerals** are found essential for sheep.
- Out of which **7 are major mineral** i.e. Na, Cl, Ca, P, Mg, K & S.

Sodium chloride (NaCl)

- Sheep consume more NaCl per 100 kg body weight than do cattle.

- Sodium chloride should be provided regularly.

- Generally Sodium chloride is added at the rate of **0.5% in complete ration** or **1% in concentrate**.

Calcium and Phosphorus

- Sheep reared on **good pasture** or when **1/3rd legumes** do not suffer from Ca deficiency and therefore addition of Ca and P depends on the amount of these minerals supplied by feeds.
- P content of **0.16-0.19%** in ration (DMB) is adequate for pregnant ewes, Milch ewes P should be **0.23%**
- If rations low in phosphorus is fed to pregnant ewes, abortion or weak lambs occurs.

Cobalt

- **Deficiency** leads to **anaemia, retarded growth, rough hair coat**. Drenches of about **1.0 mg cobalt chloride** twice a week corrects deficiency.

Copper

- It is essential in **melanin production**.
- Cu reserves of the lamb satisfy wool (Keratin) formation upto 6 months of age, after that Cu supplementation is necessary.
- **"Stringy Wool"** : Wool looses characteristic crimp, it resembles more like hair than wool.

Zinc

- Clinical signs of zinc deficiency occurs in ram lamb manifested by **impaired testicular growth** and **complete stoppage of spermatogenesis**

VITAMINS REQUIREMENT FOR SHEEP

- Good roughage satisfy all their vitamin needs.
- Pasture is generally high in vitamin A value (carotene content).
- The B complex vitamins are synthesized in the rumen by microbial action.
- Vitamin E requirement is usually met with normal ration, however "**Stiff lamb disease**" can be prevented by vitamin E supplementation.

FEEDING OF PREWEANED LAMBS FROM BIRTH TO 90 DAYS OF AGE

- The development of lambs in the first 4 months is faster than the kids.

- Doubling or tripling of the birth weights is reached much earlier in lambs than by kids.

- Most critical period is **first 48 hours**. If a lamb is unable to nurse within half an hour after birth, it should be assisted to suckle to get the advantage of colostrum.

CREEP FEEDING

- Lambs upto 12 weeks of age, suckling the sheep should be supplemented with creep ration which they start to consume at about 2 weeks of age.

Ingredients	I	II	III
Maize flour	67	50	30
Barley flour	-	17	-
Oat flour	-	-	37
Groundnut cake	10	10	10
Wheat bran	10	10	-
Rice polish	-	-	10
Fish meal	10	10	-
Meat meal	-	-	10
Mineral mixture	2	2	2
Sodium chloride	1	1	1

- Along with creep mixture, adequate amount of Vit A supplement should be given. At 90 days of age, about 300 g of creep mixture is consumed by a lamb.

- After the development of rumen, good quality leguminous fodder/hays, may be given.

- The lambs should be allowed to suckle the dam twice daily and kept separately where creep mixture, roughage, mineral mixture and water are available at free choice.

- **After 10th day:** Good quality legume + concentrate mixture @ 50-100 gm/day along with salt and MM.

BW (kg)	Concentrate mixture (g/day)	Roughage* (g /day)	Remarks
12 -15	200	400	8 hours grazing / roughages
16 -25	250	600	8 hours grazing / roughages
26 -35	300	700	8 hours grazing / roughages

FEEDING OF PREGNANT EWES

- Gestation period of ewes is about 143-151 days, on an average **147 days.**

- During first half of gestation period growth of foetus is not rapid and thus maintenance requirement is sufficient

- In later half of gestation growth rate of foetus increases

- But a precaution should be taken to avoid underfeeding during this period.

Ingredients	Parts
Maize/Jowar/Bajra	30 parts
Groundnut oil cake	20 parts
Rice Bran	40 parts
Molasses	7 parts
Mineral Mixture	2 parts
Sodium chloride	1 part.

- Concentrate mixture @ **150-250 g/day** + 8-9 hrs of grazing on good pasture or grasses.

- If grazing is not practiced, vitamin preparation @ of 25g/100 kg of feed.

- The **excessive energy intake** during last 6 weeks of gestation leads to **fattening** which results in **birth difficulty** in single bearing ewes. Whereas **low energy intake** can result in **low birth weight** with **reduced viability in lambs**.

The advantage of extra allowances of feed given during the last half gestation period are as below:

- It **increases birth weight of lambs**.
- It **reduces number of weak lambs**.
- It **reduces chance of lambing paralysis** which occurs just before lambing.
- It **increases milk of ewes** and thereby avoids tendency for disowning their own lambs.

FEEDING OF ADULT SHEEP AND LACTATING EWES

Feeding of adult sheep

- Adult sheep should be allowed to graze freely on grass land and should be supplemented with 100 gm of concentrate mixture.

- If legume or hay is available then concentrate mixture need not be given.

- When legumes are fed alone digestive disturbance increases, so some dry fodder like straws should be given.

- When sufficient pasture land is not available and straw is available then feeding of straw along with 300-400gm of concentrate mixture should be done.

FEEDING EWES AFTER LAMBING

- Immediately after lambing the concentrate ration for ewes should be reduced

- During this period good quality hay, legume should be given along with a little quantity of concentrates (about 50-100 gm)

FEEDING OF LACTATING EWES

- First 10 days after lambing legume hay may be fed.
- After 10 days upto weaning **250 g of concentrate mixture** may be supplemented with **legume hay**.
- Feeding during 4 weeks of lactation is critical and affects lactational performance of the ewes.
- Therefore feeding of **800 g good legume hay** or **100 g/day concentrate mixture** for **75 days after lambing** + **8 hours of grazing** is recommended for feeding of lactating ewes.
  - Fats: A minimum of **3% fat in sheep ration** is essential.
  - Salt licks are kept in their shed

Systems of sheep rearing:

- Extensive system
- Intensive system
- Semi-intensive system

Extensive system

- In this system, availability of energy & protein for more than half of the year is less than the requirements.
- This system leads to low productivity. Sheep weigh only 15-16 kg at 9-12 months of age
- Lower dressing percentage (35-40%) and narrow bone:meat ratio (1:4). The reproduction is also affected with high mortality in lambs and kids.

SEMI-INTENSIVE SYSTEM

- It is a combination of free range grazing and stall-feeding.
- Poor nutritive value of native pastures and crop residues makes it necessary to improve the nutrient intake for better animal performance.
  - Free grazing for 8-10 h/d & supplementation with 2.0 % of body weight with concentrates
  - Supplementation with concentrates has been shown to increase dressing percentage, lambing and kidding percentage, increased birth weight of lambs and kids and reduced mortality, and increased wool yield.
  - In addition to grazing, pregnant ewes & lactating ewes will supplemented with **300g/h/d conc. mix.** (12 % DCP & 65 % TDN).

INTENSIVE SYSTEM

The intensive system of sheep includes complete stall feeding on cultivated fresh or conserved fodders, crop residues and concentrates.

- This system requires high labour and capital investment
- **Judicious use** of available feed and fodder resources, crop residues, agro-industrial byproducts is possible
- Energy wasted for grazing can be conserved for B.Wt. gain
- Complete diets containing tree leaves/crop residues/legume hays or grass hay and concentrates in the ratio of **50:50.**
- **Lambs:** On complete diets, ADG of 100-150 g, FE, 14-15, finishing BW of 25 kg at 6 M and 30 kg at 9 M.
- Least cost feed formulations: Leguminous fodders, tree and shrub leaves, cheaper energy supplements (jowar, bajra, etc) and protein supplements (mustard cake, guar meal, sunflower cake)

I . Composition of creep ration (DCP 18-20 % and TDN 70-75%)		**II. Concentrate mixture for supplementation** (DCP 12- 14% & TDN 60-65 %)	
Maize	20%	Maize	20%
Gram	20%	Gram chuni	32%
Groundnut cake	35%	Groundnut cake	15%
Wheat bran	23 %	Wheat bran	30 %
Mineral mixture	2.5 %	Mineral mixture	2.5 %
Common salt	0.5 %	Common salt	0.5 %

III. Complete diets based on crop residues (CP : 12-14 %, TDN : 60 - 65 %)

- **Crop residue : 25 %** (Sorghum straw / Maize stover / Bagasse / Sunflower straw / Cotton straw)
- **Groundnut haulms : 25 %**
- **Maize grain : 18 %**
- **Groundnut cake :12 %**
- **Wheat bran : 17 %**
- **Mineral mixture : 2 %**
- **Salt : 1%**

FEEDING OF BREEDING EWES (FLUSHING)

- **Flushing :** Nutritional care of breeding ewes 3-4 weeks before mating by providing additional concentrate mixture.
- The effect of flushing is more evident in ewes that were underfed.
- Most of sheeps are bred 2-3 weeks after the onset of rains as grazing conditions are improved by this time.
- To obtain increased lambing rate, breeding ewes should be given **250 g concentrate mixture** or **500 g hay/head/day** 3-4 weeks before breeding.