# Factors Affecting Digestibility of Feed

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**Author/s :** Dr. Abu Bakar Sufyan / Assistant Professor, Faculty of Veterinary Sciences, Bahauddin Zakariya University Multan - Pakistan.



## A. ANIMAL FACTORS

### 1. Species

- Roughages high in crude fibre are better digested by ruminants than by non-ruminants due to the pre-gastric fermentative digestion that occurs in the ruminants.
- In several non-ruminants, post-gastric fermentative digestion occurs which helps in digestion of crude fibre.
- Pre-gastric fermentative digestion is highly efficient since the nutrients released are digested and absorbed in stomach and small intestine.
- The ruminant is more efficient in the digestion of high-fibre, low protein forage; whereas the simple-stomached pig is more efficient in digestion of high protein, low-fibre feedstuffs.

### 2. Age

- Very young or very old animals are usually less efficient in their digestion of feeds. In case of old animals, their ability to chew feed is impaired by worn

out teeth. Declining health and reduced secretion of enzymes may adversely affect the digestibility at an advanced age.

- The young ruminants can neither eat nor digest roughage until their digestive tracts, especially their rumens are developed.

**3. Work**

Light work seems to improve digestibility of feeds, while heavy work depresses it.

**4. Individuality**

Within same species, individual variation of as much as 25% has been observed in the digestive ability of the same feed. However, most animals have shown variation of about 4 - 5%.

**5. Level of feeding**

Generally, when more feed is consumed by the animal, the rate of passage of the digesta in the alimentary canal is faster and the digestibility declines due to lesser retention time. This effect has been significantly observed in ruminants and to some extent in swine as well.

**6. Sudden change**

Changing feed composition suddenly decreases digestibility mostly in the case of ruminants

**7. Pathological and stressed animal**

Digestibility is decreased in stressed and mostly in diseased animals.

**8. Indigenous secretions into feces**

Apparent Protein digestibility does not account for indigenous secretion that becomes the part of feces. Fluctuations in indigenous part cause variation in digestibility measurement.

## B. PLANT FACTORS

**1. Chemical Composition of Feed**

- The digestibility of forages is closely related to the chemical composition. Forage high in crude fiber is poor in digestibility.
- The chemical composition of the forage is affected by number of factors like soil composition, manuring and fertilization, water supply, stage of maturity of the plant, frequency of cutting, variety and strain of the plant, climate, etc; the predominant factor being the stage of maturity when cut.

**2. Plant Variety**

Differences among varieties within the same species may be due to the physical composition of the plant.ie: leaf to stem ratio, soil fertility, etc. Early cut fodder has higher digestibility than late-cut.

**3. Stage of Harvest**

With maturity lignin contents of plant/forage increases as digestibility is decreased.

**4. Level of Starch**

High level of starch with low fiber in Ruminant's diet can result in decline in pH of rumen that reduces the cellulose digestibility.

**5. Solubility of Protein**

Solubility of nutrient/feed is positively correlated with digestibility.

## C. PREPARATION OF FEED

**1. Particle size of the feed**

- In general grinding increase digestibility, because of increase surface area for enzymatic action. If roughages are ground to fine grinding, digestibility of fibre is decreased while total consumption is increased due to increased rate of passage.
- Rumen fermentation pattern is also changed due to fine grinding of feed.

**2. Soaking**

Soaking of grains and feed in water before feeding generally increases digestibility.

**3. Processing of grains/feed**

Processing by boiling, steam processing, micronization, pelleting, extrusion cooking, improves their digestibility. However, some processing may result in heat damaged protein that is comparatively less digestible.

**4. Associative Effect of Feeds**

One feed may influence the digestibility of other feed called “Associative Effect” of feed. e.g protein facilitate rumen micro-organisms that break down complex carbohydrate.

- *Protein level:* When several feeds are fed in a ration, one feed may influence the digestibility of the other. This "associative effect" of feeds on one another's digestibility is more evident in the case of ruminants, when the addition of a protein or NPN compound to a low protein ration increases the microbial digestion of the crude fibre by stimulating the growth of microorganisms in the rumen. Thus as the dietary protein level increases, the digestibility of all the nutrient increases. Similarly, as the dietary protein level is lowered, the digestibility of all the nutrients decreases.
- *Carbohydrates:* The nature and level of dietary carbohydrates affect the digestibility of all nutrients present in the diet. High crude fibre content of mixed diets decreases their digestibility. The higher the percentage of crude fibre in a ration, the lower is the digestibility of dry matter and all other nutrients.
- *Salt and water:* Adequate amount of salt and water tend to improve overall digestibility.

**5. Added fats/oil**

Added fats (more than 8% in ruminant’s diet) tend to reduce fiber digestion as oils coat the feed particles and microbes.

**6. Addition of Additives:** Additives e.g. enzymes and antibiotics in feed tend to increase digestibility

**Sources:**


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## Author/s

**Dr. Abubakar Sufyan**

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