

Water in Animal Nutrition

Animals need fresh water for their bodies to function. They gain water not only through the action of drinking but also from the food they eat. Water is vital for bodily functions such as **regulation of temperature, nutrient uptake, removing wastes, body weight, and health.**

Source of Water

The water needs of livestock are filled from three major sources:

(1) free drinking water, (2) water contained in feed, and (3) metabolic water produced by oxidation of organic nutrients.

Metabolic water refers to **water created inside a living organism through their metabolism, by oxidizing energy-containing substances in their food.** Animal metabolism produces about 107-110 grams of water per 100 grams of fat, 41-42 grams of water per 100 g of protein and 60 grams of water per 100 g of carbohydrate.

Factors affecting on the water requirement:

1. Feed dry matter intake:

Dry matter intake is the amount of feed a cow consumes per day on a moisture-free basis.

2. State of production (type of production)

The water intake increase when the animal in productional state (lactation, pregnancy, growth). Some of water loss in milk so the animal require more water for lactation.

3. The season and environment :

In winter the water intake decrease while in summer water intake increase. In hot weather increase the water intake. The heat loss by radiation, conduction, convection & evaporation increase in hot weather so the water intake increase for that.

Conduction transfers heat from one object to another through physical contact.

Convection transfers heat to air or water.

Radiation transfers heat via infrared radiation.

Evaporation transfers heat as water changes state from a liquid to a gas.

4. Type and age of animal:

In suckling animal water intake less than adult from water because it depend on milk or liquid diet in nutrition while in older animal water intake increase

Water contamination:

1. Chemical contamination by mineral elements.
(chloride, nitrate, sulfate) & Organic compounds

Organic contaminants include herbicides, pesticides, and plant and animal tissues, and are usually expected to cause adverse impacts on the animals.

2. Blue-green algae & bacterial contamination this contamination can be lethal to the presence of neurotoxin or hepatotoxin.

Symptoms poison of water :

- 1 - Hemoglobin urea.
- 2- Colic and diarrhea ,irregular heart rates ,dilatation of superficial blood vessels
- 3- Hair erection, high salivary secretion , fluids accumulation in smooth tissue under skin
- 4- Increasing body itching .
- 5- At mortality the animal expanding head and neck

Properties of pure water :-

- 1 - Color less , odor less , taste less liquid
- 2- Boiling point 100c , freezing point 0c
- 3- A solvent to many substance
- 4- Absorbs and retain heat
- 5- Neutral PH

Functions of water:

The functions of these bodily fluids include

- 1,digestion. 2. Absorption. 3. Circulation. 4. creation of saliva.
5. transportation of nutrients. 6. maintenance of body temperature.

How much water do animals need to survive?

Livestock Species	Water Needed Per Animal Day
Dry Cows	2-8 L water per 1 kg Dry matter 28-32 L (average)
Lactating Cows	3-5 L water per 1 L milk
Horses(mature)	6 L
Sheep and Goats	4-8 L water

Source of lack of water from animal body

1. Loss through the skin: one of the most important means of eliminating excess heat from the body the method of evaporation of water to regulate its temperature, and this loss is increased by an increase in muscle activity and an increase in air temperature. The absence of sweat glands or being few in most types of animals, the lungs can play an important role the process of eliminating body heat by the process of eliminating water vapor by way of exhalation.

2. Loss through the kidneys: The two kidneys regulate the volume and composition of body fluids, and they also regulate the volume of water excreted according to the volume of the amount consumed from it, the amount of water used in the organs, and the concentration of compounds produced from metabolism catabolism, such as inorganic elements and nitrogenous compounds such as urea, in which water is used, and for the kidneys the ability to filter and hold the filtrate and absorb water again and thus it works to reduce water lost to a

minimum. The body's needs of water increase with the increase in the loss, which is proportional to the amount of mineral elements and protein in the food, and the reason is due to the lack of metabolic water produced when consuming high content feeds high protein in comparison with the amount of metabolic water produced from the catabolism of fats and carbohydrates. In birds, ammonia, which is the final product of protein metabolism, is converted into uric acid which is thrown as a solid with a loss of a small amount of water to dilute it in addition to the demolition of protein and its expression in this way saves more metabolic water compared to the amount of metabolic water produced from catabolism of protein in the form of urea as is the case with mammals, and on this basis the needs of the birds from the water are less than the needs of the mammals, and accordingly, the birds are less sensitive to temporary shortage of water. As for mammals, it can withstand hunger more than it can withstand thirst.

3. Loss through the digestive system: Water is lost during the processes of digestion and absorption, and the amount depends water lost on the type of feed increases with an increase in the proportion of coarse feed intake and by an increase in the proportion of non-feed portions. Digested food, and that amount varies according to the type of animal, so cows lose more water compared to Sheep, where the percentage of water in the feces of cows is 80% water, while the feces of sheep are drier.