ECRONICON OPEN ACCESS

EC VETERINARY SCIENCE
Guest Editorial

Importance of Water Supply in the Animal Health

Sándor Gy Fekete*

University of Veterinary Medicine, Budapest, István u. 2, Hungary

***Corresponding Author:** Sándor Gy Fekete, University of Veterinary Medicine, Budapest, István u. 2, Hungary.

Received: September 06, 2022; **Published:** September 12, 2022;

Huge area of the Earth's surface (363000 km^2) is covered by water, but the actual climate changes are continuously reducing the water supply in every corner of the earth. Without water, there would be no life on Earth. Approximately 70% of the mammalian body is water. Life probably began in water. Reactions in living cells take place in solutions. Water, having a very high specific heat capacity, can hold large amounts of heat without a substantial rise in temperature. As a consequence, water does not only supply the matrix in which all living processes occur, but it also participates in those processes. One of the most important properties of water in nutrition is its remarkable ability to dissolve substances. This property is due to its high dielectric constant, which promotes ionization of electrolytes and allows oppositely charged ions to move independently of each other. This facilitates cell reactions and makes water a remarkable solvent. As a solvent, water performs the vital functions of transporting nutrients and metabolites throughout the body to satisfy the needs of cells and excrete waste products. Biochemical reactions in the body does not only take place in solutions, but water actually takes part in reactions.

Role of water in the animal organism

Some of the important reactions in digestion and intermediary metabolism involve the chemical addition or release of water, and water catalyses numerous other reactions. It is doubtful whether any chemical reaction in the body proceeds in its absence. To be able to accomplish the control of influx and efflux of materials, most cells are freely permeable to water and water continuously enters and leaves cells diffusing readily along its concentration gradient throughout the tissues. Changes in osmotic pressure cause immediate water movement and the selective permeability of membranes to various ions operate to regulate cell water.

Water helps in maintaining the shape of body cells; it lubricates and cushions joints and organs in the body cavity. Most of the waste compounds are eliminated through the urine and faeces. The high specific heat capacity and high heat of vaporization of water are due to its hydrogen bonds. A given amount of water requires more heat to raise its temperature and to convert it from liquid to vapour than almost any other substance. These properties make it possible for the large amounts of heat produced by metabolism to be dissipated with very little change in body temperature.

Water losses from the animal body

Water losses occur in urine, from the skin, with expired gases and in the faeces. Lactating animals also lose large amounts of water in milk. End-products of protein catabolism (urea in mammals, uric acids in reptiles and birds) are excreted by the kidneys. Thus, urine comprises many end-products of his protein catabolism and minerals, too. Concentrated water solution of urea is toxic for cells and tissues; in the urine it is diluted to an innocuous concentration and eliminated. Water requirement of birds related to protein intake is smaller than in mammals, because the protein to uric acid pathway produces more metabolic water, than the protein to urea pathway does and the dry matter content of the bird urine is lower.

Water losses in faeces, in comparison with other species is the highest in ruminants where it equals approximately the urinary water losses. (In humans the faecal water losses are only 7 - 10% of the amount lost in urine water). Water content in faeces of high fibre forage eating cattle may reach 60 - 70%. The majority of faeces water in ruminants derives from the saliva and digestive juices. Diarrhoea or use of purgatives may significantly increase faecal water losses.

The water cycle in animal is presented through the example of an adult horse. The daily water consumption is 14-20 litres. By means of saliva 40, gastric juice 20 and the intestinal juice 20 litres liquid enters the gastro-intestinal tract. From the hind gut 80 - 90 litres are reabsorbed. By exhalation and perspiration 6 - 16, by faeces 4 - 5 and by urine 4 - 8 litres of water leaves the body. It is clearly shown that although a huge amount of water participates in the daily cycle, owing to the intestinal reabsorption (enterosystemic cycle) the real water requirement is relatively small.

Water requirements of the living organisms

Water is gained by ingestion or as an end product of cellular metabolism. While much of water loss from the body is continuous, the ingestion of water is periodical, due to habit or to a daily rhythm of eating and drinking. Water deprivation causes both the sensation of thirst and an associated behavioural drive to drink water. Thirst is characterized by a dryness of the throat and mouth due to a decrease in salivary secretion. Besides, signals arise from the alimentary tract which informs the central nervous system of the approximate amount of water being ingested. The neuronal system controlling thirst and drinking behaviour is located in the hypothalamic region of the brain.

It is well known that animals are less resistant against water deficiency than against feed deprivation. First sign of a slight water restriction is a reduced feed intake and productivity. Severe water deprivation leads to weight loss and dehydration. Dehydration also means an increased excretion of nitrogen and electrolytes such as sodium and potassium. Ten % loss of the total body water is already critical and a loss of 20% may cause death. In contrast, adult animals in feed deprivation can survive 40% decrease in live weight.

Drinking water needs of the animals

Drinking water consumption is affected by many factors. Environmental temperature and humidity is largely involved, at heat stress increase water consumption occurs. At moderate temperature water consumption is directly correlated with the dry matter intake and with the faecal water losses. Thus, eating fibrous roughage increase water requirement.

Water content in or on feed is highly variable; grains may range from less than 8% to over 30% water. Forages may range from less than 5% in dry hay to over 90% water in a lush young grass. Precipitation or dew on feed may decrease drinking water consumption. The metabolic water, which results from the oxidation of organic nutrients in the tissues may account for 5 - 10% of the total water intake.

High water content of the feed reduces the need for drinking, but high salt or protein concentration of diet increases it. The use of animals may modify water intake, because milk production needs a lot of water. The type of urinary system and the excretory capacity are also important, and great differences are found when comparing mammalian and avian urinary systems. Water quality should also considered: good water should have less than 2500 mg/litre of dissolved solids; water containing over 1 g/litre sulphates may cause diarrhoea and levels of 100-200 mg/litre nitrates are potentially toxic.

Owing to the variables mentioned above, the water requirements are not fixed. However, in normal conditions, water requirements can be generally related to feed intake. Some approximations of the needs for water in livestock vary from one and a half of the amount of dry feed for rodents, 2.0 times for rabbits, 2.5 - 3 times for pigs, 3 - 4 to 1 for lactating sows, 5.5 - 6.5 to 1 for calves and increasing with temperature from 3.5 - 5.5 to 1 for cattle. Sheep and poultry need less except for egg laying.

With increasing temperature the respiratory (vaporization from the lungs) and insensible (dissipation through the skin) losses increase. Animals adapt by decreasing dry matter intake and increasing water consumption, which in turn may cause digestive troubles [1-4].

Bibliography

1. Garrow JS., *et al*. "Human nutrition and dietetics". Churchill Livingstone. Edinburgh, London, Madrid, Melbourne, New York, Tokyo (1993).
2. Janick J., *et al*. "The cycles of plant and animal nutrition". *Scientific American* 235.3 (1976): 75-86.
3. Smith G. "Livestock water requirements and water budgeting for south-west Western Australia" (2022).
4. Wildman REC and Medeiros DM. "Advanced human nutrition". CRC Press. Boca Raton, London, New York, Washington D.C (2000).

Volume 7 Issue 10 October 2022