

Management And Requirement of Water in Cattle

Dr. Tathagat P. Khobragade ^{1*}, Dr. Mikato S. Yeptho ², Dr. Abhiruchi Damor ¹

¹ M.V.Sc Scholar, Department of Animal Nutrition, College of Veterinary Science and Animal Husbandry, Junagadh, Kamdhenu University, Gujarat.

² M.V.Sc Scholar, Department of Livestock Production Management, College of Veterinary Science and Animal Husbandry, Junagadh, Kamdhenu University, Gujarat.

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Abstract: Water is fundamental for animals, being essential for their survival. Water is as important as other nutrients to a well-balanced diet that will help cattle achieve the desired level of performance. While an animal can survive longer without food than water, adequate hydration is crucial at every growth stage. Cattle cannot adapt well to water restrictions, and providing less water than needed results in decreased feed intake and reduced performance. Optimal water management involves monitoring water quality, ensuring adequate watering points and storage capacity, and implementing water conservation practices, particularly in regions prone to drought or water scarcity.

Introduction

Water is crucial for the well-being of all living organisms, including dairy cows. Max Rubner observed that the body can lose practically all its fat and over half of its protein and live. At the same time, a loss of one-tenth of its water results in death, so water ranks far above every other substance in the body in terms of the turnover rate. An animal's physiology has multiple compartments where body water is carefully distributed. It is found in the extracellular fluid outside cells, the intracellular fluid inside cells, and the interstitial fluid surrounding tissues. Animals obtain water in various ways, including through eating, drinking,

and producing metabolic water through biochemical processes. Since animals, including cattle, constantly lose water from their bodies, maintaining the water balance is essential. Both evaporation from the skin and breathing, which involves the exhalation of water vapour, cause this loss. Together, these mechanisms control the body's water balance, allowing vital activities like metabolism to run smoothly; therefore, clean water is indispensable for maintaining cow health, aiding digestion, regulating body temperature, and supporting optimal milk production. Cattle require water for drinking, proper rumen function, and nutrient absorption. Additionally, water plays a vital role in eliminating waste materials and excess heat from the cattle's body.

Functions Of Water

Water has specific unique properties, enabling it to perform wide-ranging functions in the cattle's body.

The major functions of water may be enumerated as follows: -

- It is an essential constituent of all body fluids systems.
- It is a medium in which all chemical reactions in the body take place.

- It is concerned with digestion, absorption, transport of nutrients, and excretion of waste products.
- Water softens coarse feeds and makes them palatable
- Water balance significantly influences the electrolyte balance and acid-base equilibrium.
- The latent heat of vaporisation of water also plays an important role in regulating body temperature. (Reddy, 2016)

Factors Affecting Water Requirement of Cattle

- a. Physiological state of the animal (lactating, pregnant, etc.)
- b. Diet of the animal
- c. Size of the animal
- d. Water temperature
- e. Water quality
- f. Water trough space
- g. Environmental temperature and humidity

Salient Points Regarding Watering of Dairy Animals

- Dairy animals drink water multiple times daily. Their total water intake depends on their feed type and whether they are milking or dry.
- Typically, cattle consume 30 to 40 percent of their daily water requirement within one hour after milking.
- Cattle prefer drinking water between 17–27°C rather than extremely cold or hot water.
- Water troughs should maintain a minimum depth of 3 inches to allow animals to submerge their muzzles 1 to 2 inches deep.
- In paddocks, each group of animals requires at least two watering points (water troughs) to ensure all animals can access water as needed, minimising disturbance from dominant animals.
- As a general guideline, water intake is about 8–10 per cent of body weight under favourable environmental conditions. It

may increase to 13–14 per cent of body weight during hot weather (Biswajit Roy *et al.*, 2018).

Dairy Cattle

Milk comprises approximately 87% water, underscoring the vital role of quality water in dairy cattle management. Farmers ensure cows have continuous access to fresh water, recognising its critical importance. Water needs for lactating cows are intricately linked to milk production, feed moisture content and environmental conditions like air temperature and humidity. Typically, peak water intake for cows aligns with periods of highest feed consumption.

Water Management of Cattle

- **Clean water excess:** Dairy cows should continually access clean water. Water troughs or tanks should be routinely cleaned and inspected for debris or algae buildup. Dirty water can discourage cows from drinking enough, potentially causing dehydration and lowering milk production.
- **Water Quality:** Ensuring high water quality is crucial for cows' health. Regularly testing water sources for contaminants like bacteria, nitrates, and heavy metals is essential. Any issues should be addressed immediately using appropriate filtration or treatment methods to guarantee purity. Certified laboratory tests should assess pH levels, bacterial contamination, sulphate, nitrates, and minerals. Based on these findings, take necessary steps to rectify water quality problems, including installing filtration systems such as activated carbon filters or UV sterilisers if required.
- **Reduce water wastage:** To prevent overflowing water troughs and tanks, be attentive and utilise float valves to stop overflow and minimise water waste. Additionally, pipelines should be regularly inspected for leaks, as even minor cracks can lead to significant water loss. Address any

Table 1: Identifies water use by major growth stages of dairy animals and breaks down the estimated water consumption of a milking cow by its level of milk production.

Dairy Cattle Type	Level of Milk Production (kg milk/day)	Water Requirement Range (L/day)
Dairy calves (1-4 months)	–	4.9-13.2
Dairy heifers (5-24 months)	–	14.4-36.3
Milking cows	13.6	68-83
Milking cows	22.7	87-102
Milking cows	36.3	114-136
Milking cows	45.5	132-155
Dry cows	–	34-49

Table 2: Water Constituents Affect Beef Cattle Performance

Constituent	Reduced Performance	Unsuitable for Beef Cattle
Nitrate (ppm)	450 - 1,300	>1,300
Salinity/TDS (ppm)	3,000 - 7,000	>7,000
Sulphate (ppm)	500 - 3,300	>3,300
Faecal coliform (No./100ml)	1,000 - 2,500	>5,000
pH	>8.5	>10

(Braul *et al.*, 2001)

(Gaurav Jain *et al.*, 2023)

Table 3: Safe levels of potentially toxic nutrients and contaminants in water for livestock. (Adapted from Meehan *et al.*, 2021)

Element	Safe Upper Limit of Concentration (ppm or mg/L)
Aluminium	5.0
Arsenic	0.2
Barium	10
Cadmium	0.05
Calcium	1,000
Chromium	1.0
Copper	0.5
Fluoride	2.0
Lead	0.1
Molybdenum	0.5
Nickel	1.0
Nitrate	100
Nitrite	33
pH	5.5 to 9.0
Selenium	0.05
Sodium	1,000
Sulphate	500 to 1,000
Vanadium	0.1
Zinc	25.0

issues promptly to ensure efficient water management.

- **Monitoring water intake:** It is crucial for identifying potential health issues in cattle. Automated systems like water meters or flow sensors can track individual or group consumption. Deviations from standard intake patterns may signal health problems needing further investigation.

Conclusion

Water is a crucial nutrient in animal nutrition, physiology, and farm management, essential for supporting overall health and productivity in livestock. It is vital for hydration, digestion, body temperature regulation, and waste elimination. Ensuring high water quality is fundamental for cattle health and productivity. Regular testing for total dissolved solids (TDS), coliform bacteria, salinity, and other contaminants is necessary to provide safe drinking water for livestock. Monitoring these parameters helps farmers prevent health issues and promotes their herds' optimal growth and productivity. By effectively managing water intake and quality, farmers can significantly enhance animal welfare and the sustainability of their operations. This strategy optimises animal performance and improves resource efficiency and resilience to environmental challenges, ultimately ensuring the viability and success of livestock farming.

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