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WATER FOR DAIRY CATTLE & BUFFALO

Importance of Water

Water constitutes **60 to 70 percent** of the body of livestock. **Water is necessary for:**

- maintaining body fluids and proper ion balance
- digesting, absorbing, and metabolizing nutrients
- eliminating waste material and excess heat from the body
- providing a fluid environment for the foetus; and
- transporting nutrients to and from **body tissues**

The water that dairy cattle need is supplied by **drinking**, by the **feed** that they consume, and by **metabolic** water produced by the oxidation of organic nutrients. Water **loss** occurs via **saliva, urine, faeces, and milk**; through **sweating**; and by **evaporation** from body surfaces and the **respiratory tract**. The amount of **water lost** from the body of cattle is influenced by the **activity of the animal, air temperature, humidity, respiratory rate, water intake, feed consumption, milk production** and other factors.

Water Intake and Requirements

Lactating cows: Drinking or free water intake satisfies 80 to 90 percent of the dairy cows' total water needs. The amount of water a cow will drink depends on her:

- ✓ size and milk yield
- ✓ quantity of dry matter consumed
- ✓ temperature and relative humidity of the environment
- ✓ temperature of the water, quality and availability of the water
- ✓ amount of moisture in the feed

Water is an especially important nutrient during periods of heat stress. The physical properties of water are important for the transfer of heat from the body to the environment. During periods of cold stress, the high heat capacity of body water acts as insulation – conserving body heat.

Dry cows: The major factors affecting free water intake of dry cows are:

- ✓ concentration of dry matter in the diet
- ✓ dry matter intake, and
- ✓ amount of protein in the diet

Calves and heifers: During the liquid feeding stage, **calves** receive most of their **water as milk or milk replacer**. However, studies show that **calves offered water** in addition to a liquid diet **gain faster** and consume **dry feed earlier** than calves provided water only in their liquid diet. Therefore, it is recommended to provide water to calves receiving liquid diets to enhance growth and dry matter intake.

As with all livestock, water should be **fresh, clean and always available** and care should be taken to ensure adequate water supplies during periods of heat stress.

Drinking Behavior

Providing the opportunity for livestock to consume a relatively **large amount** of **clean, fresh water is essential**. Water is consumed **several times per day** and is generally associated with feeding or milking. Cows may consume **30 to 50 percent** of their daily water intake **within 1 hour after milking**.

The temperature of drinking water does not affect drinking behaviour and animal performance very much. Given a choice of water temperature, **cows prefer** to drink water with **moderate temperatures** (63-82°F) rather than **very cold or hot** water.

Water Quality

Hardness is generally expressed as the sum of calcium and magnesium reported in equivalent amounts of calcium carbonate. The hardness of water has no effect on animal performance or water intake.

Nitrate can be used in the rumen as a source of nitrogen for synthesis of bacterial protein, but reduction to **nitrite** also occurs. When absorbed into the body, nitrite reduces the **oxygen carrying capacity of blood** which can lead to **asphyxiation** in severe cases. Symptoms of nitrate or nitrite poisoning are labored breathing, rapid pulse rate, frothing at the mouth, convulsion, blue muzzle and bluish tint around eyes, and chocolate-brown blood. More moderate levels of nitrate poisoning have been incriminated in **poor growth, infertility problems, abortions, vitamin A deficiencies, reduced milk production**, and general unhealthiness. The general safe concentration of nitrate in water is less than 44 ppm and less than 10 ppm of nitrate-nitrogen.

Sulfate guidelines for water are not well defined, but general recommendations are less than **500 ppm for calves and less than 1,000 ppm for adult cattle**. Hydrogen sulfide is the most toxic form and concentrations as low as 0.1 milligrams per liter can reduce water intake.

pH is a measure of acidity or alkalinity. The preferred pH of drinking water for dairy animals is 6.0 to 8.0. Waters with a pH outside of the preferred range may cause non-specific effects related to **digestive upset, diarrhea, poor feed conversion, and reduced water and feed intake**.

Microbiological analysis of water for coliform bacteria and other microorganisms is necessary to determine sanitary quality. Since some coliform bacteria are soil-borne or non-fecal, a fecal coliform test may be used to determine if the source of total coliform is at least in part from feces. For young calves, total and fecal coliform counts should be less than 1 per 100 ml. For adult animals total

and fecal coliform counts should be under 15 and 10 per 100 ml, respectively. Total bacteria count measures virtually all pathogenic as well as non-infectious bacteria that use organic nutrients for growth. **Total bacteria counts** in excess of **500 per 100 ml** may indicate water quality problems.

Blue-green algae have been reported to cause illness when cattle are allowed to consume water containing this organism. Although the causative agent has not been identified specifically, cattle should be prevented from drinking water with heavy algae growth. **Symptoms in blue-green algae poisoning** include in-coordination of voluntary muscle movement, bloody diarrhea, convulsions and sudden death. Shading of water troughs and frequent sanitation will minimize algae growth.

Calculating Water Needs

Dairy animals do vary greatly in their daily stock water requirements depending on:

- ✓ breed
- ✓ stage of lactation and milk production
- ✓ water quality, and
- ✓ ambient temperature

Daily water intake by milking cows can be estimated as follows:

- Dry matter intake per day in kg x 6
- **Plus** 1 liter of water per every liter of milk produced daily
- **Plus** additional allowances for extremes of weather

For example

- Assume a dry matter feed intake of 12 kg, multiply by 6 = 72 liters of water
- If the cow is producing 10 liters of milk = 10 liters of water
- So, the total water requirement is 72 + 10

Remember!!

Water should be available to dairy cattle at all times. If this is not possible a 'rule of thumb' is to **supply 1 litre for every 10 kg bodyweight plus 1.5 litres per litre of milk produced**.

So, a cow weighing 325 kg producing 10 kg of milk per day should be given a minimum of $325/10 + 1.5 \times 10$ litres = 32.5 + 15 = **47.5 litres daily**