TECHNICAL NOTES

Low-Cost Constant-Temperature Water Bath

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Artificial rumen (in vitro) digestion techniques are becoming important for determining the nutritive value of range forage. These techniques are used to evaluate digestibility of feeds for livestock. Although in vitro techniques are relatively new in range research, several recent articles have described their usefulness. For example, Wallace, Hubbert, and Raleigh (1963) reported in vitro cellulose digestibility values of crested wheatgrass. Van Dyne (1962) reviewed methods and presented results on variables that affect estimates of cellulose and dry-matter digestibility by artificial rumen systems. He found two requirements (Van Dyne 1963) of an artificial rumen system for range studies to be: (1) large capacity (many samples) and (2) simplicity and portability.

In setting up facilities for in vitro digestibility determinations, a system for incubating microorganisms is essential. This paper describes a low-cost constant-temperature water bath used as an incubating system for determining in vitro digestibility of range forage. The materials used for construction of this system cost less than $65.

Equipment necessary for the water bath includes a watertight container, a water heating element, a temperature control unit, a water stirring device, and a digestion tube rack (Figure 1). The watertight container must be large and deep enough to contain many digestion tubes. The water bath described in this paper was constructed from a soft-drink cooler box (Figure 2). The insulation of the box helped stabilize the temperature of the bath. The stainless steel interior makes the bath durable. This system will accommodate over 250 digestion tubes of 100-ml capacity.

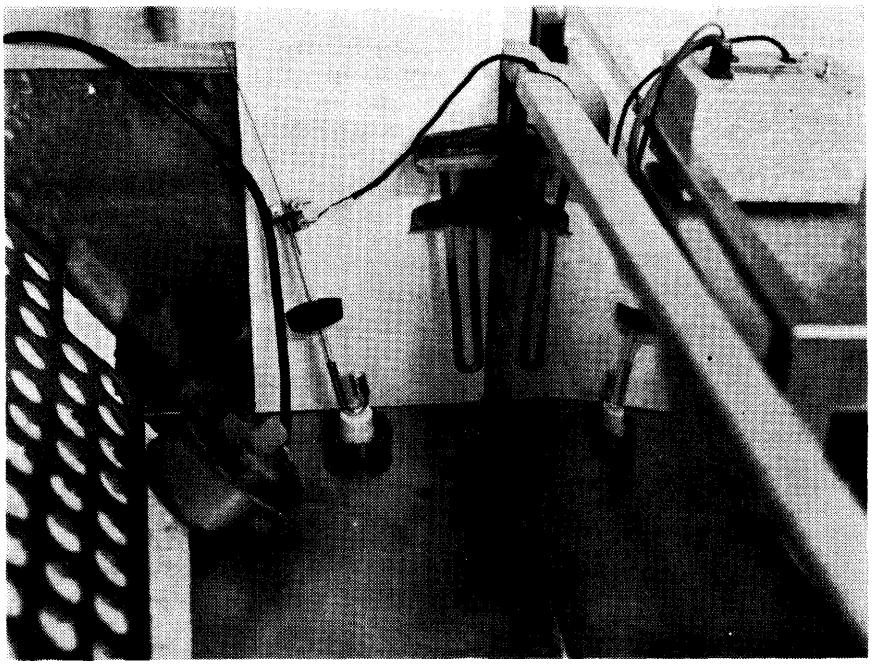

FIGURE 1. Equipment used in the water bath include (L to R): a styrofoam and masonite digestion tube rack, a water circulating pump, a J-shaped thermostat tube, a U-shaped heating element, and a thermo-regulator relay box.

The heating element was a 1,000-watt, U-shaped, immersion-type water heater. A precision temperature regulator was used to control the heating element. This unit consisted of a J-shaped pyrex glass thermostat tube filled with mercury and a sensitive liquid, and a relay box. Although less precision is acceptable for maintenance of the desired 38.5° C temperature, the unit used provides sensitivity of ±0.02° C. To obtain temperature uniformity, the water was circulated with a small immersion-type water pump. An electric motor equipped with stirring paddles would serve the purpose equally as well.

The water bath was fitted with a floating digestion-tube rack made of 1-inch-thick styrofoam. Masonite was placed on the upper side of the styrofoam to prevent damage when

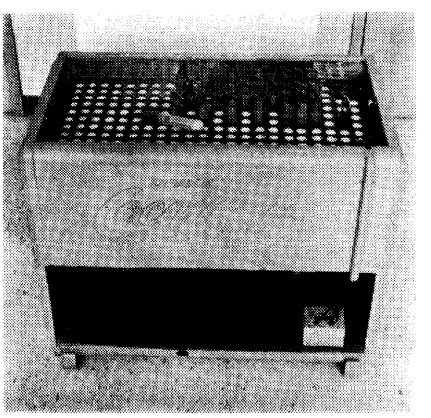

FIGURE 2. Constant-temperature water bath for artificial rumen (in vitro) digestibility studies of range forage. Inside dimensions of the water bath are 37.5x21x10 inches.

[1] *Central headquarters of the Rocky Mountain Forest and Range Experiment Station are maintained at Fort Collins in cooperation with Colorado State University.*

inserting and removing the digestion tubes. Holes were cut through the masonite and styrofoam for the digestion tubes. Flanges at the tops of the digestion tubes prevented their dropping completely through the digestion-tube rack. The desired water level around the digestion tubes was maintained with the floating rack, even when the water level in the bath was lowered because of evaporation.

LITERATURE CITED

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