Results and Discussion

Table 2 shows the percent DMD for the fresh and lyophilized rumen fluids. No significant differences (P>.1) due to treatment of the fluid were observed; however, a significant effect due to week was observed. The within treatment variations for all the fluids were large, and may reflect the innate variation within the IVDMD procedure itself. The relative rank of efficiency of DMD for each treatment varied between weeks, suggesting a treatment by week interaction. Because of the vast practical benefit that a storable rumen inoculum product for IVDMD use would afford, these data confirm the efficacy of such a product and suggest that further investigation into the accuracy and repeatability of the lyophilization process is warranted.

Bovine Boots - A New Research Tool

F. P. Horn and G. E. Miller

Story in Brief

To meet the need for precise determinations of forage intake by grazing livestock, an Animal Weight Telemetry System has been developed. Four "boots" containing electronic load cells generate analog signals which are summed, converted to a digital signal and transmitted to a laboratory receiver for interpretation. Minor changes in body weight, coupled with observation of grazing behavior, permit direct and precise measurement of intake continuously or at selected intervals.

Introduction

Two major determinants of forage feeding value are digestibility and intake potential. Evaluation of forages as livestock feed under grazing conditions poses special problems to researchers because of the tendency of grazing animals to "select" plants or parts of plants. Furthermore, livestock eat different amounts of forage when they graze from when they are fed in confinement in pens or stalls. Precise measurement of intake has heretofore been impossible. Expensive and inaccurate estimates of intake have often been assigned to forages for purposes of forage-quality ranking, feed formulation and animal performance prediction. The "bovine boots" will allow development of more reliable feeding programs and promote more efficient and economical livestock nutrition research.

Materials and Methods

A beef steer has been outfitted with boots and accessories needed to determine the pressure exerted on the ground because of its body weight.

The basic components of the "Bovine boots" telemetry system include (1) a laboratory-housed base facility to activate the field equipment, receive data and condition those data, (2) backpack-housed signal conditioning and transmitting equipment, (3) harnesses to support electrical cables on the animal and (4) boots/

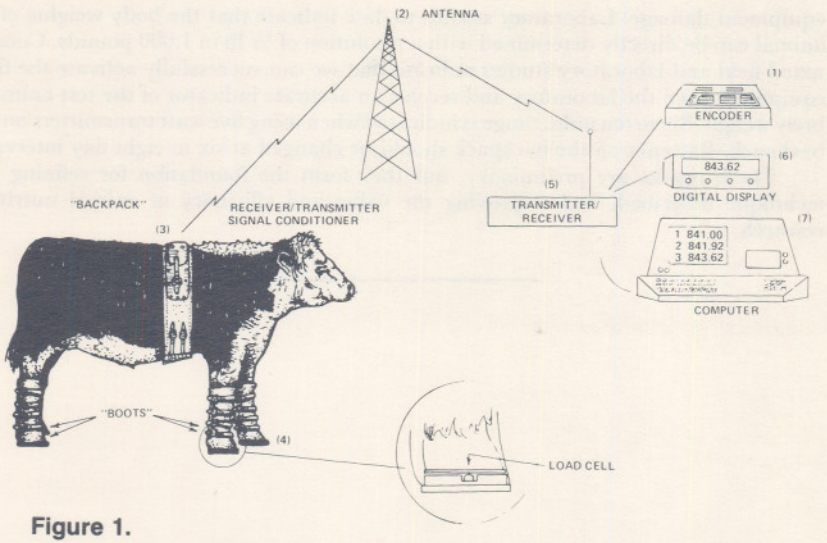

Figure 1.

transducers to convert the pressure resulting from the animal's body weight into a signal suitable for transmission. The relationship between these components of the system is illustrated in Figure 1.

The system currently under study at the Southwestern Livestock and Forage Research Station, has the capacity to monitor 36 animals in rapid sequence or a single animal constantly, as desired. The weighing is accomplished via the following sequence of events:

- The operator indicates the animal selected by keying in animal ID number on encoder.
- The encoder transmits a radio activating signal via the base transmitter to the backpack receiver/transmitter.
- Independent analog signals from four transducers (one in each boot) move from the boots to the backpack, then are summed and converted to binary-digital format for transmission.
- The backpack transmitter sends the digital signal to the base receiver.
- The operator reads the animal's body weight on a digital readout (optionally data may be directed to a "mini-computer" in standard RS232 data format).

The system, therefore, allows one operator, through use of the encoder and digital readout, to instantaneously determine the precise body weight of the grazing animal. In order to conduct research on several animals concurrently, the operator would sequentially determine body weights by entering a series of animal identification numbers into the encoder. The radio equipment transmits in the FM, operating in the 144 to 175 MH_z band; hence, range is determined by "line-of-site" as well as backpack transmitter output.

Results and Discussion

Field studies over the past 12 months have only included tests of the boots (with transducers), harnesses and backpack. Equipment has been developed which under "normal" conditions will function properly with a minimum of maintenance and

equipment damage. Laboratory studies to date indicate that the body weights of an animal can be directly determined with a resolution of ½ lb in 1,000 pounds. Coordinated field and laboratory studies indicate that we can successfully activate the field equipment from the laboratory and receive an accurate indicator of the test animal's body weight. Six to ten miles range is indicated when using five watt transmitters on the backpack. Batteries on the backpack should be changed at six to eight day intervals.

These results are preliminary, but they form the foundation for refining the technique described, and improving the value and efficiency of animal nutrition research.