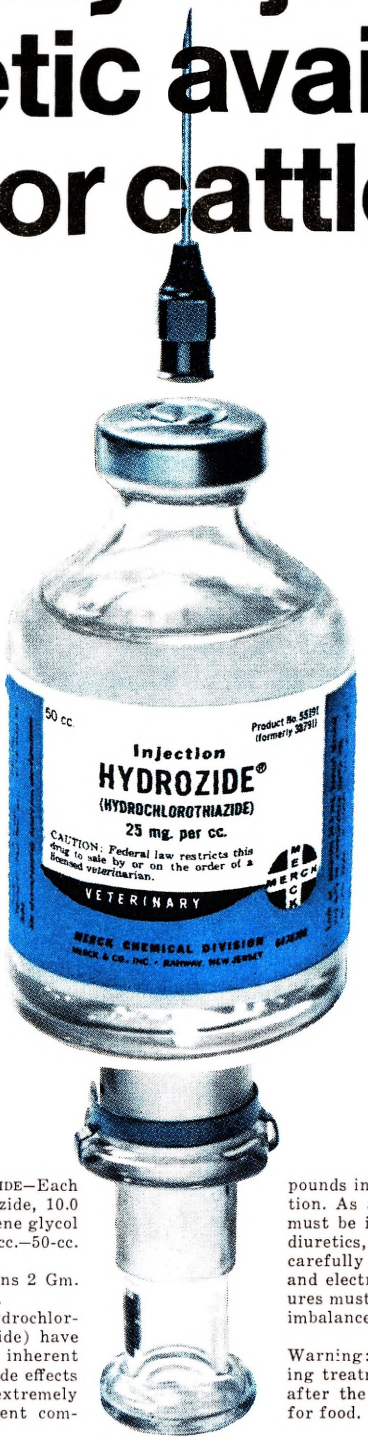
General Session

Chairman: Dr. Vernon Tharp, Ohio State University

*Calculating Least Cost Balanced Rations*
*Differential Diagnosis of Digestive Tract Disorders*

# The only injectable diuretic available for cattle....




**Product Information** Injection HYDROZIDE—Each cc. contains 25 mg. hydrochlorothiazide, 10.0 mg. benzyl alcohol, 0.45 cc. polyethylene glycol 300, and water for injection, q.s. 1.0 cc.—50-cc. vials.

DIURIL Boluses—Each bolus contains 2 Gm. chlorothiazide—packages of 5 and 50.

Precautions: Both HYDROZIDE® (hydrochlorothiazide) and DIURIL® (chlorothiazide) have a high therapeutic index and a low inherent toxicity. No untoward reactions or side effects have been noted in cattle, even with extremely high doses. However, they are potent compounds in their influence on electrolyte excretion. As a result, dosage and administration must be individualized. As with other potent diuretics, the animal should be regularly and carefully observed for the early signs of fluid and electrolyte imbalance. Appropriate measures must be taken to prevent or correct such imbalance if it occurs.

Warning: Milk taken from dairy animals during treatment and for 72 hours (6 milkings) after the latest treatment must not be used for food.


**. . . and has a potent, orally administered follow-up form for dispensing.** HYDROZIDE® (hydrochlorothiazide) is the only injectable diuretic available today that gives you the therapeutic results you want in postparturient mammary edema: the fast action of an injectable (I.V. or I.M.). It assures you of immediate action. Response is evident within 24 hours.


A full course of treatment should include follow-up with DIURIL® (chlorothiazide) boluses which you can dispense. Whether used in oral or injectable form, or both, thiazide usually restores normal fluid balance in 72 hours.

In addition to speedy diuresis, you get unusual safety and minimum side effects with both HYDROZIDE and DIURIL. Either can be used in the presence of severe cardiac, renal, and hepatic diseases.

Fast action, easy follow-up, maximum safety. Get them all with the HYDROZIDE - DIURIL two-step procedure. Available through professional distributors only.

MERCK CHEMICAL DIVISION
Rahway, New Jersey

VETERINARY

MERCK

# Calculating Least Cost Balanced Rations

DALLAS HORTON, *D. V.M.*
*Colorado State University*
*Ft. Collins, Colorado*

The first step in formulating a least cost balanced ration is to determine the requirements for the class of animals that you are trying to balance the ration. There are many references where this information can be found. An excellent reference is *Applied Animal Nutrition* by Crampton and Harris. This text includes tables which list the different feeds and the nutrient requirements for each class of livestock. If your client has, for example, 400 lb. steer feeder calves that he would like to grow at a pound and a half per head per day, then turn to the table on feedlot cattle and find the class and weight of livestock with this daily rate of gain. From this table (Table 1) we can determine the amount of energy and protein needed for this animal to gain a pound and a half per day. There are other factors such as calcium, phosphorus, vitamin A, and NaCl which are balanced in a ration, but this paper will deal only with energy and protein as indicated in Table 1.

Table 1

Requirements for 400 lb. Steer Feeder Calf to Gain 1.5 lbs./day

| | | |
|---|---|---|
| Body Weight | 181 kg x 2.2 lbs. | = 398 lbs. |
| Ave D Gain | .72 kg x 2.2 lbs. | = 1.58 lbs. |
| Daily Feed | 5.53 kg x 2.2 lbs. | = 12.0 A.D. feed |
| Crude Protein | 12% x 12 lbs. | = 1.44 lbs. |
| TDN | 53% x 12 lbs. | = 6.36 lbs. |

After determining the requirements for the class of livestock in question, the second step is to determine the nutrient source to meet these requirements. This decision is based on which sources provide the greatest amount of nutrient or nutrients for the least money, or in other words, a least cost ration. We must also keep in mind that the completed ration has to be not only least cost, but also balanced and palatable. Least cost balanced rations which are not palatable do not remain least cost very long! In a growing program where only a pound and a half gain per day is desired, the bulk of the ration will be composed primarily of roughages. The first step is to determine what

available roughages are present and the cost on a per hundred weight basis of each roughage. Next the cost per hundred weight of each roughage is divided by the calculated amount of TDN from a laboratory analysis or the TDN in a table where the roughages are listed. The quotient derived is the cost in cents for one pound of TDN in that particular roughages. We repeat this same mathematical procedure for all roughages. Whichever roughage provides a pound of TDN for the least amount of money is the roughage of choice. As we can see in Table 2, timothy is the hay of choice.

Table 2

Roughages

| | Cost/Ton | TDN | Cost/CWT | Calculations | Cents/Lb. TDN |
|---|---|---|---|---|---|
| Crested Wheat - Grass | $30 | 42% | 1.50 | $\frac{1.50}{42}$ | = 3.57 |
| Timothy | $30 | 49% | 1.50 | $\frac{1.50}{49}$ | = 3.06 |
| Western Wheat Grass | $32 | 51% | 1.60 | $\frac{1.60}{51}$ | = 3.14 |

In this paper TDN is used as an energy value although for feedlot cattle a sophisticated net energy system is more accurate. The initial calculation is with energy because it is the most expensive element in a total ration, and the product of which we feed the most number of pounds. Protein is usually the most expensive per unit cost, but since we feed considerably less pounds of protein than energy to an animal its total cost in a ration is considerably less.

If the roughage selected does not provide enough energy to provide a pound and a half per day, the next step is to select a concentrate which will elevate the energy in the ration enough to meet the energy requirements for the desired daily gain. The concentrate of choice will be one that provides the most amount of energy for the least money. This choice is made by dividing the cost per hundred weight of the concentrate by the number of pounds of TDN in the concentrate as was done for the roughages. See Table 3.

Table 3

Concentrates

| | C.P. | TDN | Cost/CWT | Calculations | Cents/Lb. TDN |
|---|---|---|---|---|---|
| Barley | 10% | 74% | $2.25 | $\frac{2.25}{74}$ | = 3.04 |
| Oats | 11% | 68% | $2.40 | $\frac{2.40}{68}$ | = 3.53 |
| Corn | 9% | 78% | $2.20 | $\frac{2.20}{78}$ | = 2.82 |

This same calculation is also used to determine which source of protein will provide the greatest number of pounds of protein for the least amount of money. When several protein sources have been selected, the one that provides a pound of protein for the least cost is the protein supplement that is selected. See Table 4.

Table 4

Protein Supplement

| | Crude Protein | Cost/CWT | Calculations | Cents/Lb. of C. Protein |
|---|---|---|---|---|
| DEHY | 20 | $3.00 | $\frac{3.00}{20}$ | = 15 |
| SBOM | 45 | $5.00 | $\frac{5.00}{45}$ | = 11.1 |
| CSM | 41 | $4.00 | $\frac{4.00}{41}$ | = 9.8 |
| LSM | 35 | $4.20 | $\frac{4.20}{35}$ | = 12 |

The following factors should be remembered when computing a ration:

1. Make certain that the feed requirements table and the calculations used in the feed ingredients are on the same basis. As an example, if the table of requirements is on an air dry basis, the calculations and tables used for the nutrient sources should also be on an air dry basis. The following formulas can be used to convert a feed from "As Is" to Air Dry to Dry Matter and vice versa:
   1. As Is x % Dry Matter = Dry Matter
   2. Dry Matter ÷ 0.9 = Air Dry
   3. Air Dry x 0.9 = Dry Matter
   4. Dry Matter ÷ % Dry Matter = As Is
2. When two nutrient sources are approximately the same cost per pound of TDN the one with the highest protein content should be selected. By using the higher protein source the number of pounds of protein supplement that will have to be added to the energy source is decreased.
3. Palatability should be kept in mind when selecting nutrient sources.

The progressive D.V.M. should consult a nutritionist for information regarding grain processing, effect and profitability of certain feed additives, availability and solubility of a number of ineral supplements on the market, and using linear programming for least cost ration evaluation. The veterinarian should use the Ph.D. nutritionist in the same manner that he uses people in the basic sciences of the veterinary profession. The general practitioner today may not always know the answers to a problem but he should know the sources.

We should associate ourselves with the profit margins of an operation and showing a client that we can save him money on a least cost balanced ration immediately places us in that position. In the past we have usually been involved with diagnosis and treatment only, and as a result have not been associated with profit margins, but rather with bad luck, death loss, and high drug bills. Our decisions have to be economically sound first and medically sound second. I hope this presentation has given you an "instrument" to make you feel, and more importantly make your clients feel, that you are making these decisions.