Research in Progress:

Air Structure for Feedlot Cattle

David Ames and Calvin Drake

Climatic variables have a drastic impact on the performance of beef cattle. Maximum efficiency can be expected at a thermoneutral effective temperature[1]. When ambient temperature falls far below the thermoneutral zone for a beef steer, large quantities of energy are required to maintain body temperature. This of course, lowers efficiency by lowering net energy available for production. When the ambient temperature rises above the thermoneutral, feed intake drops, energy is used in panting and sweating and again net energy for production is reduced. The thermoneutral zone for cattle is approximately 50°F and varies somewhat with external insulation (hair coat). Small deviations in effective temperature (± 20°F) have little effect on energy needed to maintain body temperature. However, effective temperatures far below or far above the thermoneutral zone significantly lower animal efficiency. Obviously, beef cattle would benefit from temperatures maintained within 20°F of the thermoneutral zone. With this in mind, a confinement system using an air structure to buffer the ambient environment was initiated.

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1 Effective temperature is defined as the combination of dry bulb temperature, humidity, and air velocity expressed as equivalent still air temperature.

Comparison of Biuret and Soybean Meal for Wintering Cows on Bluestem Pasture (Project 253)

H.A. Thyfault, E.F. Smith and L.H. Harbers

Biuret, a non protein nitrogen compound, has shown promise as a protein substitute for ruminants fed poor quality roughages. Urea, by comparison, cannot be used without an adequate supply of energy in the form of either grain or molasses. Biuret is not broken down to ammonia so rapidly as urea is. Biuret, therefore, is less toxic than urea.

Studies were initiated in December, 1969, with cows grazing dry bluestem pasture to compare soybean and biuret as protein sources for wintering pregnant cows.

Methods

Experiment I. Forty-eight 5 year-old cows were initially divided into two groups of 20 and 28 animals to uniformly stock two pastures. Each group was further divided for hand feeding of (1) a soybean-sorghum grain mix and a (2) biuret-sorghum grain mix (table 22). The rations were isonitrogenous and isocaloric. The cows were hand fed in lots each morning. Animals had access to water, salt mixture (table 23), and pasture the remainder of the day. Data on monthly cow weights, birth date and weight of calf, weaning weight, and conception rates are being recorded. The experiment will continue through the spring and summer.

Experiment II. Twenty cows were randomly divided into two equal pastures and supplemented with 3.3 lbs. sorghum grain per day plus vitamins (table 1). Biuret [1] was added in a separate salt mixture (table 2). Data collected are the same as those in Experiment I. In addition, mineral mix consumption was determined and expressed per head per day.

Results

Monthly weights of cows are given in figure 1. The complete supplements were designed to meet present NRC recommendations. As expected, cows fed the soybean-sorghum grain mixture gained approximately 0.3 lbs./head/day. Cows fed the biuret-sorghum grain mix lost approximately 0.2 lb./head/day.

The two groups fed biuret in the mineral mix (Experiment II) are not directly comparable because of the initially low mineral-biuret mixture intake; however, they received the same level of energy as those on the complete supplement (Experiment I). The first part of the experiment shows that additional protein was necessary as weight loss was greatest when mineral consumption was low.

Other researchers found that cows would consume the biuret-mineral mixture at 0.1-0.16 lb./head/day. Our data verify their conclusion (figure 2). By adding various amounts of ground sorghum grain, we increased consumption of biuret-mineral to 1.0 lb/head/day. After accepting the mix, the animals restricted their intake to 0.7 lb./day with no additional grain added to the mix. At that level, the animals were consuming 0.35 lb. biuret/head/day. That should supply the protein requirement if the NPN compound is synthesized to protein. The average salt intake was 51.5 grams per day; 45 grams is thought to be adequate.

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1 Kedlor - trade name for biuret -- supplied by Dow Chemical Company, Midland, Michigan.

Table 22. Composition of Complete Supplements Used in Experiment I

Component	Soybean	Biuret
Soybean meal, lb.	37.8	------
Biuret, lb.	------	8.1
Sorghum grain, lb.	62.2	91.9
Vitamin A, I.U.	6.70×10^5	6.62×10^5
Vitamin E, I.U.	670	662
Daily consumption, lb.	3.0	3.3

Table 23. Composition of Mineral Mixtures

Mineral	Experiment I	Experiment II
Biuret	00.0	50.0
Bone meal	65.3	32.4
Salt	33.3	16.2
Trace minerals	1.2	1.2
Sulfur	0.2	0.2

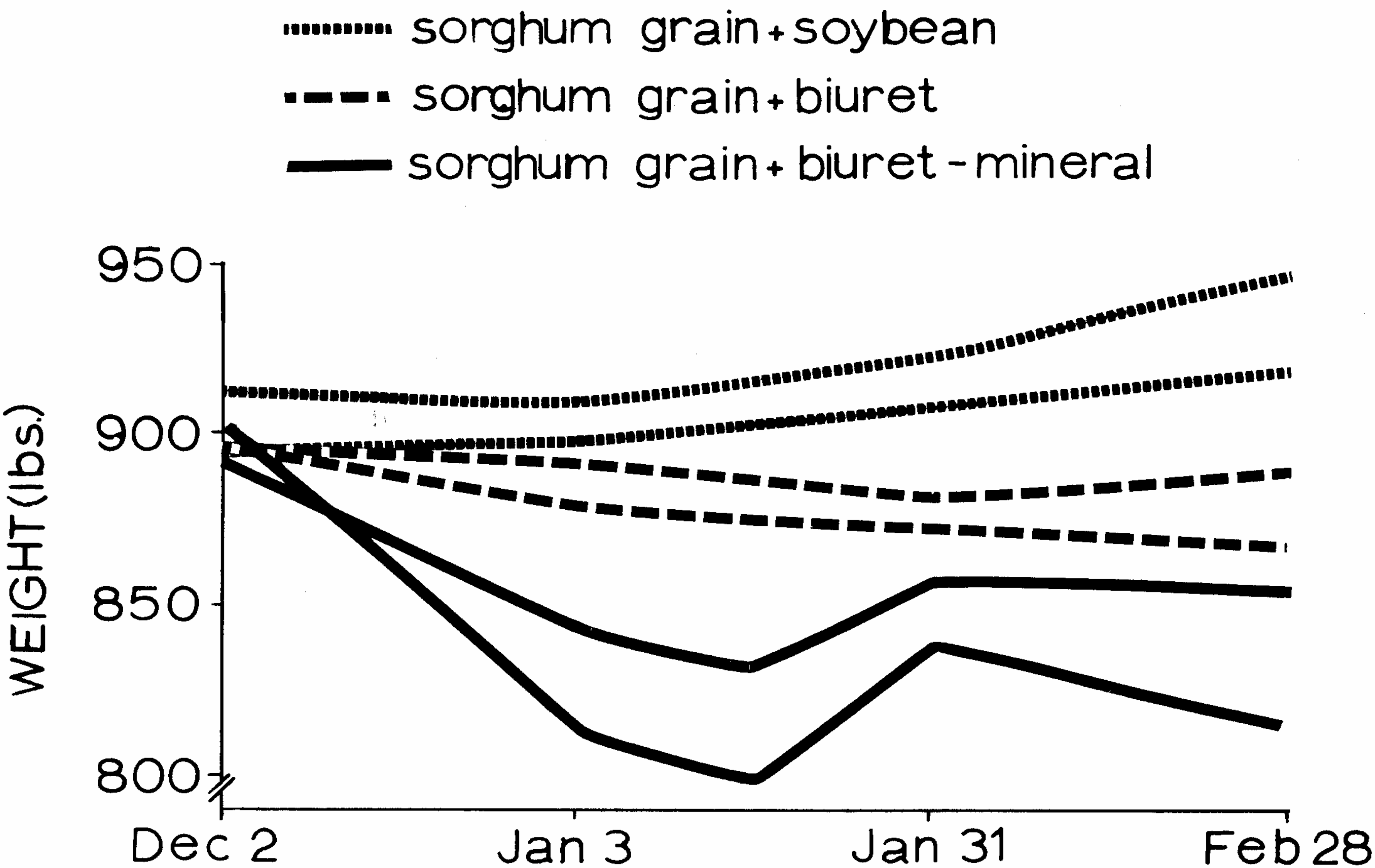
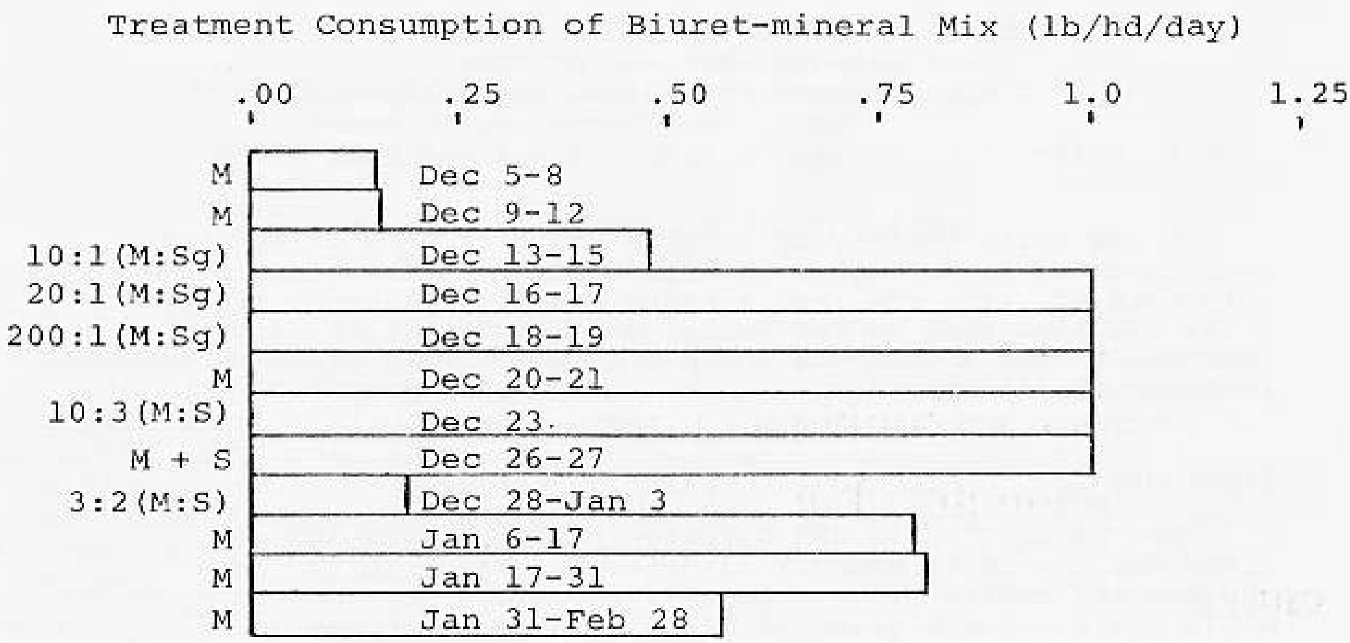
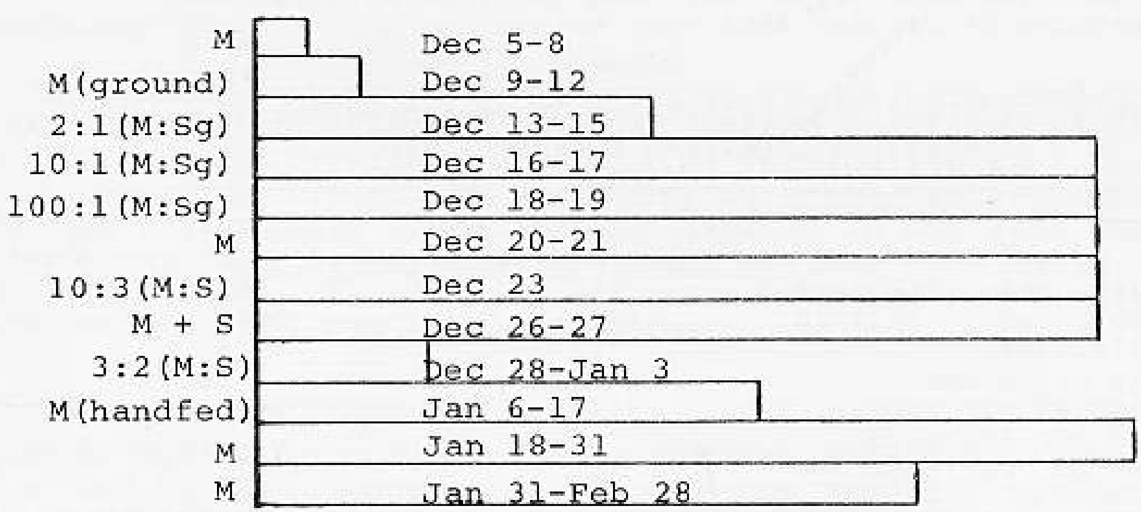


Figure 1

Weight Change of Cows Fed Soybean or Biuret



M---biuret mineral mix alone free choice
M:Sg---ratio of biuret mineral mix to fine ground sorghum grain
M:S---ratio of biuret mineral mix to salt
M+S---biuret mineral mix alone with salt offered separately



Group II (10 head)

Figure 2. Consumption of Biuret-mineral Mixture by Cows on Various Treatments