ALFALFA GRAZING MANAGEMENT AND EFFECT OF POLOXALENE AND MONENSIN ON FEEDLOT BLOAT

by

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Explanation of Measurement Systems Used

It is by the authors design in this thesis that the alfalfa grazing data is reported using the U. S. system of measures. It is a practical trial and the greatest benefit in presenting the information by this system will undoubtedly be its easy use by the farmer or extension agent.

The information presented in trial 2 is done so using the metric system of measures because it is a scientific study.

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TRIAL I. PASTURE AND CATTLE MANAGEMENT WHILE GRAZING ALFALFA

Introduction

The use of alfalfa as pasture for cattle is not a new concept. Cattlemen have, by trial and error, found several ways to reduce the incidence of bloat and have grazed alfalfa with varying degrees of success. With the clearance of poloxalene and its incorporation into various feeding systems, interest in grazing alfalfa has accelerated; most notably in areas of Texas, Utah, Idaho, and Washington. However, the practice of grazing alfalfa in this region of the High Plains was limited until 1979 when, due to favorable cattle prices, limited demand for alfalfa by dehydrating plants, and increased fuel costs an interest developed in grazing alfalfa.

No information was available on what to expect production-wise or economic-wise under Kansas conditions. Therefore, our aim was to determine the potential for alfalfa grazing in Kansas and what changes in management techniques were needed, if any, from those reported in the literature for other regions.

Literature Review

Value of Alfalfa Grazing

Alfalfa produces large quantities of highly nutritious forage. Prebloom alfalfa contains approximately 71% total digestible nutrients (TDN) and 23% crude protein (Alexander et al., 1969; Mascola et al., 1971; Miller, 1958). Dry matter digestibility, however, drops by approximately 10% from prebud stage to the mature stage, so harvesting early is essential for maximum nutrient yield (Hibbs and Conrad, 1975). Hence, on a dry basis, a yield of 6 tons of alfalfa per acre contains the same quantity of energy and substantially more protein than corn grain at 167 bushels per acre (National Research Council, 1976). However, the amount of beef produced per acre from forage determines its economic worth (Knight, 1979). Average daily gains should also be considered of equal importance because producing the same gain per acre with fewer animals will save on operational and interest costs (Welty, 1979).

Intake and performance are usually greater for pure stands of alfalfa than for grass or alfalfa-grass mixtures. Acord (1970) reported a gain of 1608 lb of beef per acre from grazing straight alfalfa and 1208 lb per acre from grazing an alfalfa-grass mixture. Average daily gains were 1.50 and 1.16 lb respectively. In a second trial, average daily gains were 1.85, 2.00, and 2.19 lb for grass, alfalfa-grass and straight alfalfa, respectively. Pounds of beef per acre, in the same order, were 660, 850, and 1141. Moore (1970) stated that heifers gained more on an alfalfa-grass mixture than on sudangrass. Spivey (1971) reported gains of 2.40 lb per day and 1290 lb per acre while grazing straight alfalfa. Similar results were found by Ensminger et al. (1944) when comparing alfalfa-grass mixtures with smooth brome and western wheatgrass, and Van Keuren and Heinemann (1958) when comparing alfalfa-grass mixtures with ladino-grass mixtures and straight grass. In a 3 yr average comparing ladino-grass mixtures with alfalfa-grass mixtures, Hubbard and Nicholson (1964) reported near equal average daily gains (2.16 and 2.10 lb, respectively) and equal gains per acre (853 lb). Heinemann and Rogers (1973) reported that average daily gains and pounds of beef per acre were similar for alfalfa and orchardgrass. However, in an earlier study Heinemann and Rogers (1971) found a 9% decrease in gain per acre from alfalfa compared with orchardgrass. Although straight alfalfa plus 2.54 lb of grain produced 1185 lb of beef per acre in a Montana trial conducted by Welty (1979), alfalfa plus 1.25 lb of grain produced 1024 lb, while orchardgrass plus 1.32 lb of grain gave a gain of 1122 lb. The alfalfa stand suffered winterkill and considerable weed invasion occurred. This led the author to state, "Composition of the mixture may be more important than total yield in producing total liveweight gain per acre." Therefore, it appears that at times grass pastures produce as much or more beef than alfalfa. But, in the absence of legumes, nitrogen is the most limiting factor in growth of pasture grasses (Rohweder and Thompson, 1973), and it is becoming increasingly more expensive (Knight, 1979).

Alfalfa requires less fertilizer for maximum production than other pasture species. Salter and Schollenberger (1939) estimated that 75 to 90% of nitrogen, phosphorus, and potassium consumed are subject to recycling. Properly inoculated alfalfa fixes its own nitrogen, so it is less a concern than the other nutrients. Unlike nitrogen, there is evidence of benefit from the slow-moving nutrients, phosphorus and potassium. Peterson _et al._ (1956) found that 75% of phosphorus and 80 to 90% of the potassium consumed passes through the animal. They stated that, at high stocking rates, excretal return of phosphorus and potassium may be of substantial importance to the fertility of a pasture.

Grazing alfalfa conserves energy other than fertilizer. Reseeding is done only about every 6 years (Pretzer, 1980) so there is not yearly seeding and cultivating as with annual crops. This system also alleviates problems of fescue foot and grass tetany (Knight, 1979). Alfalfa-grass mixtures are often difficult to maintain in the intended proportions (Ayre-Smith, 1971: Welty, 1979) and they may induce bloat because of selective grazing for alfalfa (Acord, 1969; Ayre-Smith, 1971).

Alfalfa Bloat

Bloat can be a problem when grazing alfalfa. Without proper control measures, devastating animal losses can occur (Clark and Reid, 1970). Even greater economic loss results from limited use of high yielding legumes in pastures because of the fear of bloat (Bartley, 1967).

One bloat preventive method which has been used for years and which Ayre-Smith (1971) suggests should still be considered is the feeding of dry hay. This was done by several researchers in the past as a sole prophylactic and as a supplement to other methods of bloat control (Cole et al., 1943; Colvin et al., 1958; Hull et al., 1957; Meyer et al., 1956; Mishra, 1964; Van Keuren and Heinemann, 1958). Complete bloat prevention with dry forage, while grazing straight alfalfa is reported a few times in the literature (Cole et al., 1943; Mishra, 1964). Cole et al. (1943) reported complete prevention of bloat when cattle were grazed on straight alfalfa from 7 a.m. to 2 p.m. daily and then kept in a drylot until 7 a.m. the next morning with free access to sudan hay. They also used alfalfa hay in the same manner and found reduction in occurrance and severity of bloat, but not complete protection. The amount of dry hay consumed per day was not reported. Mishra (1964) found that 4 lb of alfalfa hay fed prior to grazing alfalfa prevented bloat, but 2 lb did not. Others reported "effective" control of bloat but in one case (Hull et al., 1957) it was also stated, "many cases of bloat occurred in steers grazing alfalfa; some needed treatment; and one steer died from bloat." They reported 3 to 5 lb of sudan hay gave effective bloat control in yearling steers, but their use of the term "effective" is questionable. Meyer et al. (1956) fed 4 to 5 lb oat hay per head per day to yearling steers grazing alfalfa and reported effective control. Colvin et al. (1958) stated that the feeding of 12 lb oat hay per day for cows significantly reduced bloat. Because it is apparent that, in most cases, feeding dry hay does not completely prevent bloat, other means of prevention are needed.

It is recognized that the primary cause of legume bloat is excessive foaming of rumen contents (Cole and Boda. 1960). Bloat is now known to be the result of very complex interactions of the plant, the animal, and the rumen microbes (Bartley, 1974). Antibiotics were proposed by Barrentine et al. (1956 a,b) for the prevention of legume bloat. They tested several antibiotics in oral doses, but found only one (penicillin at 50 mg and above) to be effective. Later, Barrentine (1957) reported bloat control by including 800 mg penicillin per pound of salt block. Protection with penicillin, however, is very short lived due to development of resistant strains of rumen bacteria (Johnson et al., 1958 a,b, and 1959; Brown et al., 1958).

Several antifoaming agents (fats and oils) have been tested with some success, but were not entirely effective (Cole and Boda, 1960). The authors indicated that rate of removal was too fast for these products to be effective more than 3 hours.

Bartley (1965 b) established a set of criteria that a product must meet to be considered a viable prophylactic. These were: 1) one dose must provide at least 12 hr of protection, 2) it must act within 10 min, 3) it must not deleteriously affect health, reproduction, rumen function, feed intake, or quality or the amount of milk produced, 4) it must not be expelled in milk, 5) it must not be found in body tissues 5 days after administration, and 6) it must be economical. Bartley reported a surface active agent, polyoxypropylene polyoxyethylene block polymer, met the established criteria. Additional tests in that laboratory (Bartley, 1965 a; Helmer et al., 1965; Meyer et al., 1965 b) verified Bartley's earlier findings. Poloxalene[1] (the generic name for this product) gives 100%, season-long control of bloat if consumed at a level of at least 2 g per 100 lb body weight per day (Bartley, 1967and 1965 a). It has been established to be an effective bloat preventive in many studies conducted since that time (Acord et al., 1969; Bartley et al., 1965; Cope and Petr, 1976; Essig and Shawver, 1968; Foote et al., 1968; Heinimann and Rogers, 1971 and 1973; Welty, 1979).

Forms of Poloxalene Available and Their Use

Poloxalene was approved in 1966 by the Food and Drug Administration under the trade name, Bloat Guard. Bloat Guard is available in several forms for bloat prevention. These are top dress, liquid supplement, block and mineral mixture.

Bloat Guard top dress is a granular form to be used with grain as the carrier. This form is 53% poloxalene so, it should be fed at approximately 4 g per 100 lb body weight per day (Feed Additive Compendium, 1980).

Bloat Guard liquid supplement is administered through tanks equipped with lick wheels which roll freely, picking up the viscous liquid as it turns. The liquid is primarily molasses containing 7.5 or 10 g poloxalene per pound of

[1]Bloat Guard[R], poloxalene, Smith-Kline Co., Philadelphia, PA.

supplement. Consumption is controlled by phosphoric acid (Bartley *et al.*,1972).

Bloat Guard blocks contain 30 g of poloxalene per pound of block. They contain molasses to attract cattle and salt to regulate intake (Stiles *et al.*, 1967).

Bloat Guard is also available in a free-choice mineral mixture and contains 30 g of poloxalene per lb of mixture. Its consumption is also controlled by salt (Western Ranch Products, unpublished; Producers Grain Corporation, unpublished).

Very little information is presented in the literature regarding the efficacy of the various methods of administering poloxalene in controlling bloat. Acord *et al.* (1969), using 60 steers and heifers averaging 475 lb, separated cattle into 3 treatments. The control lot received salt-molasses blocks containing no poloxalene. Lot 2 received salt-molasses blocks containing poloxalene. Lot 3 received 1.50 g poloxalene per 100 lb body weight per day via 1 lb of grain (two equal feedings, one in the morning and one in the evening). The cattle were grazed on an orchardgrass-alfalfa mixture for 125 days. The control lot had 27 bloat cases, the poloxalene-block group had three and the poloxalene-grain group had none. Consumption rate of the block was not reported. But, in another study using 346 calves weighing approximately 364 lb which were fed 1.00 lb of grain and alfalfa hay ad libitum, average consumption ranged from .180 lb of block (5.40 g poloxalene) to .372 lb of block (11.16 g poloxalene) daily. Bloat incidence was 7.2% for controls and 1.9% for treated cattle. Essig and Shawver (1968) noticed that the amount of time steers spent at poloxalene-containing blocks was somewhat erratic, but severity and incidence of bloat, while grazing ladino-clover, were very low compared with controls. Stiles *et al.* (1967) conducted experiments to determine the efficacy of poloxalene-containing blocks in controlling alfalfa bloat. Although intakes varied from 0.50 lb to 0.97 lb, minimum intakes were large enough to protect against severe alfalfa bloat. Welty (1979) used poloxalene-containing blocks to prevent bloat while grazing bloat-producing alfalfa, alfalfa-grass, and clover-grass pastures. No bloat was encountered in 4 years of tests.

Acord (1970) fed poloxalene granules in a grain pellet while grazing steers and heifers on straight alfalfa and alfalfa-grass mixtures. He reported no death loss from bloat. Cope and Petr (1976) stated, when discussing the advantages and disadvantages of the various poloxalene forms, "Intake of block and granular forms has been erratic compared to consumption of the liquid form. Recommended intake is readily obtained on dry mature forage with the block or granular forms, but consumption drops sharply on alfalfa that is tender and growing rapidly." They tested the liquid molasses supplement as a vehicle for poloxalene administration. The poloxalene level was 7.5 g per lb supplement. They found death losses up to 6.9%, but they stated that bloat losses could be minimized by careful management. Bartley et al. (1972) found that there could be a great variation in individual consumption of the liquid supplement but in field trials which included approximately 300 head of cattle, only 13 head encountered bloat and only one case was severe.

It seems likely, according to the limited information in the literature, that the efficacy of any of the available forms of poloxalene depends on the given pasture situation and on how well the particular form fits a given farmer's everyday regimen.

Effects of Environment and Growth Stage on Propensity of Alfalfa to Produce Bloat

Meyer et al. (1965 a) stated that the amount of whole plant nitrogen and the incidence of bloat decreased with increasing maturity of alfalfa. Similar observations were made by Brown *et al*. (1957), who reported more bloat with increasing forage moisture content. Bloat severity usually increased about one day after a rain and decreased during hot weather. Van Keuren and Heinemann (1958) reported losses when cattle crossed a shorted electric fence, and grazed immature forage. Nichols and Deese (1966) indicated that mean dry weights of alfalfa on bloating days were significantly lower than on non-bloating days.

Increasing temperatures hasten maturity and decrease the amount of non-structural carbohydrates (Marten, 1970). Acord (1970) reported that cattle gains on pasture decreased during warm weather, but Gross and Mathesan (1964) found that alfalfa-tall fescue gave higher rates of gain during hot summers than during cool summers. So, it can be concluded that alfalfa is more likely to produce bloat when it is immature and when cool, wet weather conditions occur. That may or may not be related to a high rate of gain.

Grazing Systems

The advantages and disadvantages of continuous grazing, green chopping, strip grazing, and rotational grazing have been studied over the years by several workers. The consensus of opinion is that for maximum production and maximum stand longivity, alfalfa must be harvested in a rapid manner and then allowed an uninhibited regrowth period of approximately 25 to 35 days. The literature indicates that higher gains per head per day can be expected from continuous grazing, but gains per acre are usually much lower than that obtained by other systems. Bryant *et al*. (1970) stated that the difference in digestibility between the top and bottom of a plant and selective grazing of it may explain part of the difference in animal performance between rotational and continuous grazing systems. They further stated that more opportunity for selective grazing is a fault of continuous grazing due to lower grazing pressure. Less selective grazing occurs in pastures where quantity of herbage is restricted (Hardison et al., 1954; Coleman and Barth, 1972).

In California, Hull et al. (1971) reported 3 to 8% higher average daily gains for continuous use versus a five-pasture rotation with equal stocking rates. In Washington, Heinemann (1970) adjusted stocking rates to approximately the optimum level for each method of use and found that rotationally grazed pastures produced 20% more gain per acre than those in continuous use.

In Montana, Kopland et al. (1954) reported complete disappearance of an alfalfa stand by the end of 4 yr under continuous grazing for approximately 137 days each season. Davis and Pratt (1956) also reported a marked decline in an alfalfa stand under continuous grazing as did Bateman and Keller (1956), Fuelleman et al. (1948), and Meyer et al. (1956). Bateman and Keller (1956) also stated that the survival of high yeilding species through rotational grazing, and not the superiority of rotational grazing as such, was the principal reason for its acceptance. Robertson et al. (1979) reported no reduction of alfalfa in a stand of bromegrass-alfalfa. They attributed the persistance of alfalfa to a rotational grazing system which provided 10 to 14 days of grazing and then 30 to 40 days of rest. They moved the cattle when the forage was grazed to a height of 2.93 to 3.90 in. Jacobs (1952) stated that alfalfa remained productive after being grazed five times a season for four consecutive years. Stroupe et al. (1978) noted that weight gain per lb of forage consumed was greater for 25-day regrowth alfalfa than for 35-day regrowth alfalfa. Total crude protein content was 2.4% greater in the shorter period. Reinhardt et al. (1978) recommended harvesting alfalfa every 28 to 30 days to a height of 1.00 to 3.00 in. Van Keuren and Marten (1972) stated after reviewing the literature that alfalfa requires rotational grazing with a 35 to 42 day recovery period to maintain good stands for more than 2 or 3 years. Acord (1969) recommended 4 to 5 days of grazing and 25 to 30 days of rest. Cope and Petr (1976) advise 20 to 25 days regrowth after 5 days of grazing and leaving stubble about 4.00 in high.

Clanton and Nichols (1973) stated that rotational grazing results in greater utilization of forage than continuous use because control can be exercised over animals as to when forage is utilized and the degree and intensity of use. This control is not possible under a continuous grazing system.

Strip grazing and green chopping will increase forage utilization over rotational and continuous systems, but they also require more labor and equipment (Ittner et al., 1954; Duren, 1973).

Factors Affecting Stocking Rate

Stocking rate has a great influence on per animal and per acre liveweight gains (Bryant et al., 1961 and 1970). When grazing pressure is low, animals eat more nutritious tops and leave bottoms (Bryant et al., 1970). Hull et al. (1961) indicated that liveweight gains increase with increasing stocking rate to a point and then decrease rapidly due to lower intake per animal and, hence, a greater percentage of intake being used for maintenance. They also found that forage yield decreases as the season progresses. Welty (1979) found that mean alfalfa yields were greatest in the first rotation and decreased in each subsequent rotation. Each rotation consisted of one cycle of grazing on all paddocks. Heinemann and Rogers (1971) noticed a 38% decrease from May to June in carrying capacity of alfalfa. It stayed fairly constant June through August, dropped slightly in September and dramatically in October.

It appears that, for optimum average daily gain per animal and optimum gain per acre, stocking rates based on herbage availability are necessary. As a basis from which to start, Cope and Petr (1976) recommend an initial stocking rate of 2000 lb of beef per acre on alfalfa capable of producing 6 tons of hay per acre.

Factors Affecting Alfalfa Stand Longevity

To maintain stands, alfalfa should be allowed a 4 wk regrowth period in the fall to let the plants build up root reserves (Hanson and Barnes, 1973; Reinhardt et al., 1978). This was established long ago by Rather and Dorrance (1938), who demonstrated the extremely deleterious effects of grazing alfalfa into the fall. The result was severe winterkill.

Another factor affecting stand longevity which has been studied very little is treading. The extent of damage from treading depends on stocking rate, animal management, pasture characteristics, soil fertility (Edmond, 1970), and soil moisture (Edmond, 1963). Edmond (1963) reported that direct effects on plants such as root damage, plant displacement and burial in mud could occur. He also stated that limitation of soil air could be a factor.

Grain Supplementation

Acord (1970) grazed cattle on alfalfa-grass mixtures and alfalfa alone while feeding two levels of grain. Alfalfa-grass plus 1.00 lb of grain yielded an average daily gain of 1.16 lb and 1208 lb of beef per acre. The same pasture plus 4.00 lb of grain produced an average daily gain of 1.56 lb and 1685 lb of beef per acre. The extra 3.00 lb of grain was used at an efficiency of 8.80 lb of feed per lb of gain. At another site an alfalfa-grass pasture plus 1.00 lb of grain produced a gain of 2.00 lb per day and 850 lb per acre; straight alfalfa plus 1.00 lb of grain yielded 2.19 lb per day and 1141 lb per acre. The same pure stand of alfalfa plus 4.00 lb of grain produced 2.12 lb per day and 1302 lb of beef per acre. The extra 3.00 lb of grain was used at an efficiency of 11.4 lb of feed per lb of gain. Heinemann and Rogers (1971) supplemented Hereford steers grazing straight alfalfa with 1.25 lb and 2.54 lb of grain per head daily. Steers on the high level of grain gained 2.18 lb per day and 1185 lb per acre, compared with steers on the low level which gained 1.96 lb per day and 1024 lb per acre. Duren (1973) reported average daily gains of 2.75-3.00 lb when supplementing alfalfa pasture with 2.00-6.00 lb of a barley-molasses mixture.

Lake et al. (1974) individually fed corn at rates of 0, .50, 1.00, 2.00, 3.00, 4.00, 5.00, and 6.00 lb per head daily to 500 lb Hereford steers grazing an alfalfa-grass mixture. Energy supplementation increased weight gains linearly up to 4.00 lb of grain per head daily. Levels above 4.00 lb did not improve gains. Time required to finish the steers decreased with increased pasture supplementation. Those steers fed more grain on pasture gained equally well in the feedlot as those fed less. Cope (1974) found that feeding 3.00 lb of grain per day to cattle on alfalfa pasture did not depress subsequent feedlot performance. This suggests that 4.00 lb of grain per head daily may be the maximum quantity that can be recommended for pasture supplementation.

Management Recommendations For Grazing Alfalfa

Very few researchers have included management recommendations in their papers.

Acord (1969 and 1970), Cope and Petr (1976), and Duren (1973) recommended using poloxalene for bloat prevention. Poloxalene should be fed to cattle 2 to 7 days before being turned on alfalfa to accustom them to the supplement (Cope and Petr, 1976; Duren, 1973). The cattle should be full before turning them on alfalfa about mid-morning. They should be left on pasture constantly so they never become hungry (Cope and Petr, 1976). If feeding poloxalene through lick tanks, the tanks should be placed in loitering areas or other areas of easy access. One lick wheel per 25 head of cattle should be provided and at least one lick tank should be placed out in the field. In very large operations, one lick wheel per 50 head of cattle should be placed out in the field and it should be insured that cattle can get no further than 400 yd from the lick tanks. Each animal should consume liquid supplement at rates of .20 and .27 lb per 100 lb body weight per day for the 10 and 7.5 g concentrations of poloxalene per lb of supplement. If consumption is inadequate, salt should be placed on or near the lick tanks and rubbing posts installed near the tanks. The liquid level should be measured daily and tanks moved to more desirable areas if underconsumption is occurring. The tanks should be modified to make them portable enough to move with a pickup truck (Cope and Petr, 1976).

If feeding poloxalene through grain, half the grain should be fed in the morning and half in the afternoon (Acord, 1970). Allow sufficient bunk space for easy access (Duren, 1973). Salt and mineral (free-choice) should be provided (Cope and Petr, 1976). A mixture of 4 to 8% each of calcium and phosphorus and 40 to 65% salt is appropriate (Cope and Petr, 1976).

Alfalfa in its vegetative stage should not be grazed because it is more bloat provocative at this stage than later (Cope and Petr, 1976).

Stocking rate should be approximately 5 to 7 head of 400 lb cattle per acre (Cope and Petr, 1976). Pastures should be divided into five or six equal sections and each should be grazed 4 to 5 days before rotation to the next section. This leaves 20 to 30 days for regrowth (Acord, 1969 and 1970; Cope and Petr, 1976; Duren, 1973).

Pastures should be irrigated for maximum production (Acord, 1969 and 1970; Cope and Petr, 1976). Total water requirement is appriximately 6 in for each ton of hay produced (Cope and Petr, 1976; Rogers and Hay, 1978). Rogers and Hay

(1978) stated that if possible irrigation should be completed 5 days before harvest and not started until 5 days after harvest.

The stocking rate and rotation interval should be adjusted properly (Cope and Petr, 1976; Hubbard and Nicholson, 1964; Hull et al., 1961). Cattle should be moved when alfalfa is grazed to a 4 in height. Grazing lower than this will cause overconsumption of liquid supplement (Cope and Petr, 1976). A 30 day regrowth period should be allowed for alfalfa in the fall to allow for buildup of plant root reserves (Cope and Petr, 1976; Hanson and Barnes, 1973; Rather and Dorrance, 1938; Reinhardt et al., 1978). Alfalfa that is mature or dried out will cause overconsumption of liquid supplement (Cope and Petr, 1976).

Excessive tramping of pastures can occur especially in heavy, wet soils (Cope and Petr, 1976; Edmond, 1963 and 1970). Another area for cattle should be provided during wet periods to conserve the alfalfa stand (Cope and Petr, 1976). Fertilizer should be applied to meet plant needs (Cope and Petr, 1976).

Materials and Methods

Most of the materials, methods and results are explained on a location-by-location basis on the succeeding pages. The following is an explanation of the methodology which is common to some or all locations.

In 1979, six Kansas producers cooperated by allowing us to observe their summer alfalfa grazing operations. A total of 4050 cattle with an average initial weight of approximately 500 lb were included in the trials.

In 1980, Kansas State University placed 75 steers averaging approximately 502 lb on three grazing sites in Kansas and Oklahoma to determine actual weight gains (15 hr to 15 hr shrunk weights). These cattle were predominantly Angus, Hereford, Shorthorn, Brahman, Charolais or mixtures of these breeds. Before each set of steers was shipped to its designated grazing site, the cattle were individually weighed after being taken off feed and water for 15 hr. The same procedure was used when weighing at the end of each trial. The cattle were also visually scored for frame and condition prior to and at the end of each grazing trial. The frame scale used ranged from 1 (smallest) to 10 (largest). The condition scale used was 1 (extremely thin) to 10 (extremely fat).

The cattle were subjected to a typical feedlot processing regimen prior to the grazing season. That program included injections for infectious bovine rhinotracheitis, bovine virus diarrhea, blackleg, and worms. They were also implanted with Zeranol[2] and ear tagged at that time.

Figures used in the economic analysis were arrived at by various means.

[2]Ralgro, Zeranol, International Minerals and Chemical Corp., Terre Haute, IN.

Corn grain, silage, and hay prices used were average market values during the grazing period. The alfalfa stand establishment and fertilizer (where applicable) costs were obtained from Extension Agronomy, Kansas State University. A breakdown of the stand establishment cost is explained in table 1. Land expenses are based on Pretzer's (1979) recommendations. The hay harvesting charges are according to Schlender and Figurski (1980). Feed truck fuel is mentioned at only one location because the supplement had to be hauled several miles to the pasture. The other producers using grain supplement were grazing their cattle in close proximity to their feed preparation facility. A fuel expense of 85 cents per gallon was approximately the average retail cost during the grazing period. The costs for salt, fencing and cattle equipment were taken from Cope and Petr (1976). Implant costs used were approximately the average retail prices for each particular product at the time of use. Separate death loss figures (where applicable) were computed by estimating the value of the animal at the time of death plus costs for feed and care to time of death. All other cost data were obtained from the cooperating producers[3].

[3]Bob Barr, Dover, OK.; Burnett Feeders, Scott City, KS.; Bob and Barry Kane, Liberal, KS.; Dale and Jerry Mott, Iuka, KS.; Pawnee Beefbuilders, Larned, KS.; Terry and Jim Sallee, St. John, KS.; Ward Feedyard, Larned, KS.

THIS BOOK CONTAINS NUMEROUS PAGES WITH DIAGRAMS THAT ARE CROOKED COMPARED TO THE REST OF THE INFORMATION ON THE PAGE.

THIS IS AS RECEIVED FROM CUSTOMER.

Table 1. Computation of alfalfa stand cost.

	Per acre/year
Seed - 12 lb seed/acre x \$1.50/lb ÷ 6 yr life	\$3.00
Fertilizer - 80 lb 0-46-0/acre x 10.5¢/lb ÷ 6 yr life	1.40
Fuel - (preparation and seeding) 7 gal/hr x .273 hr/acre x 85¢/gal ÷ 6 yr life	.27
Drill rent - \$2.50/acre ÷ 6 yr life	.42
Labor - 12 min/acre x 5¢/min ÷ 6 yr life	.10
	\$5.19

Experimental Procedures and Results and Discussion for Burnett - 1979

Location- Northeast of Scott City, Kansas -- custom feeder

Acreage- 37

Soil Type- Hardland

Description of pasture- Rectangular; sloped slightly away from catch pen; hay stand was fair - produced 4 ton hay per acre in 1978; slightly infested with Kochia weed.

Pasture layout- Fenced into six rectangular shaped sections running east-west with a pen along the east end where water was available and the supplement was fed.

Irrigation- Flood irrigated only when the adjoining field of corn did not need water. Two rectangles were watered at once. Approximately 9 in of water was pumped on and an additional 4 in came as rain.

Fertilization- None

Pasture management- Harvested half the field for hay before the cattle were turned out. Hay was mature.

Fencing- One strand barbed wire with a 12 volt charger.

Grazing system- 5 days on each strip before moving, but 4 days in mid-August due to slow regrowth and increased intake.

Type and amount of supplement- 1.70 lb corn, .06 lb molasses, 2.00 lb silage, poloxalene, and 150 mg Rumensin per head per day. The amount of silage was increased in steps - July 30 to 4.50 lb, August 18 to 6.25 lb, August 17 to 8.00 lb, and September 1 to 10.25 lb. August 17 the grain was increased to 2.80 lb. Salt was fed free-choice.

Drug dosage- 10 g poloxalene per head per day

Method of feeding supplement- Supplement was fed in fence-line bunks once daily in the morning. The cattle were brought to the bunks at 8 a.m. and locked in the catch pen. Feeding was done at 9 a.m. and the cattle were held until the ration was completely consumed. The ration was mixed in a truck-mounted mixer box. 1.5 ft of bunk space was allowed per animal.

Implant- DES

Number of cattle- 188 head at the start: 11 head were removed to the buller pen during the first two weeks.

Initial stocking rate- 5 head per acre   Average- 4.76 head per acre

Type, initial wt., and final wt.- British, steers

In	Shrunk wt. (3%)	- 415 lb
	Actual wt.	- 428 lb
Out	Shrunk wt. (3%)	- 581 lb
	Actual wt.	- 599 lb

Number of days- 94 -- June 4 to September 7

ADG- 1.77 lb

Death loss- From bloat -- 0

From other -- 1

Due to soil type, some soil compaction occurred. Water penetration was hampered somewhat.

The amount of supplement was increased in an attempt to keep the rotation at 4-day intervals without having to remove any cattle.

The cattle had to be followed up to the catch pen; they would not come in on their own. The reason for holding them an hour before feeding was to be sure they were hungry. This would enhance regularity in consumption of the supplement to provide greater bloat protection.

Table 2. Economic analysis for Burnett - 1979.

Expenses		Per Head	Per Acre 4.76 hd/acre
1)	Poloxalene 10 g level 4.146 lb x $2.05/lb =	$ 8.50	$40.46
2)	Corn 1.7 lb/day x 74 days = 125.8 2.8 lb/day x 20 days = 56.0 181.8 x 6¢/lb =	10.91	51.93
3)	Molasses .06 lb/day x 74 days = 4.44 .10 lb/day x 20 days = 2.00 6.44 6.44 x 5.4¢/lb =	.35	1.67
4)	Rumensin 150 mg x 94 = 14,100 mg 14,100 mg ÷ 60,000 mg/lb = .235 lb .235 lb x $3.80 =	.89	4.24
5)	Silage 2 lb x 74 days = 148 4.5 lb x 1 day = 4.5 6.25 lb x 4 days = 25 8 lb c 9 days = 72 10.25 lb x 6 days = 61.5 311 x 1.3¢/lb =	4.04	19.23
6)	Salt	.05	.24
7)	Labor $3/hr x 2 hrs/day = $6 x 94 days = $564 $564 ÷ 176 =	3.20	15.23
8)	Irrigation and depreciation $5/acre x 37 acres = $185 ÷ 176 =	1.05	5.00
9)	Alfalfa stand 6 years life $5.19/acre	1.09	5.19
10)	Fertilizer None	--	--
11)	Medication None	--	--
12)	Implant	.50	2.38
13)	Death loss 575 lb x .85 = $490 ÷ 176 =	2.78	13.23
14)	Land and taxes $2960 - land $75/acre 140 - tax $3100 ÷ 176 ÷ 37 =	17.61	83.78
15)	Fencing and cattle equipment 5¢ x 94 =	4.70	22.37
16)	Cost of harvesting hay 1½ T/acre on 18.5 acres 27.75 x $19/ton = 527.25 ÷ 176 ÷ 37 =	3.00	14.25
17)	Transportation None	--	--
		$58.67	$279.20
Income			
1)	29,283 lb x 40¢/lb = $11,713.20 ÷ 176 ÷ 37 =	$66.55	$316.57
2)	Hay 27.75 tons + 37 tons (1 T/acre regrowth after cattle) = 64.75 tons x $60/ton = $3885 ÷ 176 =	22.07	105.00
		$88.62	$421.57
	NET PROFIT OR LOSS	+ $29.95	+ $142.37

Experimental Procedures and Results and Discussion for Ward - 1979

Location- South of Larned, Kansas -- custom feeder

Acreage- 132

Soil type- Sandy

Description of pasture- Hilly circle; hay stand was very lush - produced 9 ton hay per acre in 1978.

Pasture layout- Fenced into six pie shaped sections with a pen covering approximately two acres at the pivot where the supplement was fed and drinking water was available.

Irrigation- Sprinkled with a circle system: the sprinkler was never shut off. Approximately 31 in of water was pumped on and an additional 5 in came as rain.

Fertilization- None in the past 3 yr: 700 tons of cattle manure per acre during the previous 7 yr.

Pasture management- South half was cut for hay at the outset to start the rotation. Alfalfa was mowed under fences before moving the cattle to a new pie. The sprinkler was never run over the cattle.

Fencing- Two strands of barbed wire with a 110 volt charger.

Grazing system- 5 to 7 days on each pie

Type and amount of supplement- 4.00 lb corn, .02 lb molasses, poloxalene, .40 mg MGA[4], and 150 mg Rumensin per head per day. Beginning July 1, .13 lb of a vitamin-mineral supplement per day, and wheat straw was made available.

[4]Melengestrol acetate, MGA, Upjohn Co., Kalamazoo, MI.

Drug dosage- 7.5 g per head per day of poloxalene

Method of feeding supplement- The grain mix was fed twice daily in feed bunks at the pivot. At the beginning, one foot of bunk space was allowed per head. Wheat straw was fed free-choice at the pivot.

Implant- Ralgro

Number of cattle- 835 at the start (May 18), 222 were removed June 18, 119 were put on June 18, 151 were removed July 13, 131 were removed July 15, the remainder were grazed until September 14.

Stocking rate- 6.3 head per acre (initially)

Type, initial wt., and final wt.- Mixed heifers

In	Shrunk wt. (3%)	- 453 lb
	Actual wt.	- 467 lb
Out	Shrunk wt. (3%)	- 659 lb
	Actual wt.	- 679 lb

ADG- 119 head gained 1.67 lb, 792 head gained 1.46 lb; average for 951 head was 1.52 lb.

Number of days- 119; May 18 to September 14

Death loss- From bloat -- 2

From other -- 5

The alfalfa was mowed under the fences before moving to a new pie to discourage the cattle from reaching under and possibly getting out. The sprinkler was kept from running over the cattle so tramping out would be minimized. An extra strand of barbed wire was used as insurance against the cattle getting out.

The supplemental grain mix was fed twice daily to keep a more constant level of poloxalene in the rumen. The cattle liked the mix and would come running at first sight of the feed truck.

At the beginning of the trial, several cases of watery eyes were noticed. Also several head had weak rear legs, five of these could not stand and two died. The feedlot veterinarian suspected nitrate poisoning and thought that nitrates were inhibiting the availability of vitamin A. The management began feeding vitamin-A at the rate of 375,000 IU per pound in a vitamin-mineral supplement which also contained vitamins D and E. The watery eyes and leg problems seemed to improve.

Table 3. Economic analysis for Ward - 1979.

Expenses	Per Head	Per Acre 7.2 hd/acre
1) Poloxalene 7.5 g level 2.48 lb x $2.05/lb =	$ 5.09	$ 36.65
2) Corn 300.2 lb x 6¢/lb =	18.01	129.67
3) Molasses 1.5 lb x 5.4¢/lb =	.08	.58
4) MGA 1.25¢/day x 75.05 =	.94	6.77
5) Vitamin-mineral 5.36 lb x 12.5¢/lb =	.67	4.82
6) Wheat straw 44 tons x $15/ton = $660 660 ÷ 951 head =	.69	4.97
7) Rumensin 150 mg x 75.05 = 11,257.5 mg 11,257.5 mg ÷ 60,000 mg/lb = .188 lb .188 lb x $3.80 =	.71	5.11
8) Salt	.05	.36
9) Labor $3/hr x 2 hr/day = $6 x 119 days = $714 $714 ÷ 951 =	.75	5.40
10) Irrigation cost and depreciation $12/acre x 132 acres = $1584 ÷ 951 =	1.67	12.00
11) Alfalfa stand 6 years life $5.19/acre	.72	5.19
12) Fertilizer None	--	--
13) Medication None	--	--
14) Implant	1.00	7.20
15) Death loss (figured into cattle pay weight)	--	--
16) Land and taxes $11880 - land $90/acre 500 - tax $12380 ÷ 951 =	13.02	93.79
17) Fencing and cattle equipment 5¢ x 75.05 =	3.75	27.00
18) Cost of harvesting hay 132 tons x $19/ton = $2508 ÷ 951 =	2.64	19.00
	$49.79	$358.53
Income		
1) Cattle 108,797 lb gain x 35¢/lb = $38,078.95 ÷ 951 ÷ 132 =	$40.04	$288.48
2) Hay 132 tons x $60/ton = $7920 ÷ 951 =	8.33	60.00
	$48.37	$348.48
NET PROFIT OR LOSS	- $1.42	- $10.05

Experimental Procedures and Results and Discussion for Mott - 1979

Location- West of Iuka, Kansas -- farmer

Acreage- 132

Soil type- Sandy loam

Description of pasture- Hilly circle; infested with weeds and grass

Pasture layout- Fenced into six pie-shaped sections with approximately 2 acres fenced in the center where water was available and part of the supplement was fed.

Irrigation- Sprinkled with a circle system: the pump was inoperable for a week in mid-July. Approximately 12 in of water was pumped on and an additional 5 in came as rain.

Fertilization- None

Pasture management- Started grazing in the bud stage of growth to get the rotation going. Tried not to run the sprinkler over the cattle, but did on three occasions.

Fencing- One strand of wire with a 12 volt charger

Grazing system- 5 to 6 days on each section in the beginning, but moved to a 4-day rotation in mid-July

Type and amount of supplement- Poloxalene through molasses lick tanks. The mixture was intended to be consumed at 2.00 lb per head per day. Beginning in mid-July, a stack of alfalfa hay and a stack of wheat hay were kept available to the cattle. Phosphorus supplement and salt were offered free-choice at the pivot.

Drug dosage- 10 g per head per day of poloxalene assuming each animal ate 2.00 lb of molasses supplement. Also added 6.00 lb of poloxalene liquid per day in drinking water from August 6 to August 24.

Method of feeding supplement- Poloxalene was fed in five lick tanks with four lick wheels per tank. Four tanks were placed at the pivot and one at the outer end of the pie being grazed.

Implant- Ralgro

Number of cattle- 209

Stocking rate- 2.2 head per acre (initially), 2.14 head per acre average

Type, initial wt., and final wt.- Predominantly British steers. Individual "in" and "out" weights were taken on 25 head.

<u>In</u> Shrunk wt. (3%) - 481 lb

Actual wt. - 496 lb

<u>Out</u> Considered no shrunk weight because cattle were gathered and hauled to Pratt to the sale barn where they were sorted and weighed.

Actual wt. - 682 lb

Number of days- 99; May 18 to August 24

ADG- 2.00 lb

Death loss- From bloat -- 16

From other -- 1

Alfalfa regrowth was slowed in mid-July due to an irrigation engine breakdown. Also, the alfalfa was heavily infested with grass and weeds which did not have the regrowth capabilities of alfalfa, so the quantity of forage was reduced and a faster rotation resulted.

Lick tanks were placed in a pen with the cattle five days prior to turning them on the alfalfa.

Molasses consumption was very erratic over the entire grazing period. At the outset, intake went from a low of 1.00 lb per head per day the first day on a section to a high of 3.50 lb the last day on a section. Later on, consumption averaged just over 1.00 lb. This was thought to be partially due to one load of molasses having a bitter taste. The cattle would not eat it and never regained a tast for molasses. Also, another load of molasses was found to have only 60% the guaranteed concentration of poloxalene. Twelve head were lost from bloat during the period when there were problems with the supplement. After that, to keep from losing cattle due to low molasses intake, poloxalene was placed in the drinking water.

In mid-July, to try to stretch the carrying capacity of the growing alfalfa, alfalfa hay and wheat hay were kept available; alfalfa hay at the outer end of the pie being grazed and wheat hay at the pivot. Only 50 lb of phosphorus supplement was consumed. Several cases of "watery eyes" were noticed during the early summer. Deaths due to bloat seemed to occur more frequently the second day on a new pie.

Table 4. Economic analysis for Mott - 1979.

	Per Head	Per Acre
Expenses		
1) Bloat Guard 56,800 lb ÷ 273 hd = 208.06 lb/hd 208.06 lb/hd x 10.2¢/lb	$21.22	$43.93
2) Phosphorus supplement 50 lb x 10¢/lb = $5.00 $5.00 ÷ 273 =	.02	.04
3) Salt	.05	.14
4) Hay alfalfa - 30 tons c $60/ton = $1800 $1800 ÷ 273 =	6.59	14.78
wheat - 12 tons c $40/ton = $480 $480 ÷ 273 =	1.76	3.64
5) Interest on cattle $6000 ÷ 273 =	21.98	45.45
6) Labor 2hr/day x 99 days = 198 hr x $3/hr = $594 ÷ 273 =	2.18	4.51
7) Irrigation and depreciation $12/acre x 132 = $1584 ÷ 273 =	5.80	12.00
8) Alfalfa stand 6 years life $5.19/acre	2.51	5.19
9) Medication	.05	.10
10) Implant	1.00	2.07
11) Death loss (16 were paid for by National Molasses Co.) 1 @ $468 ÷ 273 =	1.71	3.54
12) Land and taxes $6000 - land 500 - tax $6500 ÷ 273 =	23.81	49.29
13) Fencing and cattle equipment 5¢/hd/day x 99 =	4.95	10.25
14) Transportation (already subtracted from income)	--	--
	$93.63	$194.93
Income		
1) Pay wt. = 682 lb Price = $78.69/cwt 682 x .7868 = $536.60		
Initial wt. = 481 lb Price = $100/cwt 481 x 1.0 = $481.00		
$536.60 - $481.00 =	$55.60	$144.99
NET PROFIT OR LOSS	- $38.03	- $79.94

Experimental Procedures and Results and Discussion for Kane - 1979

Location- Northeast of Liberal, Kansas -- farmer

Acreage- 87

Soil type- Sandy

Description of pasture- Small circle; produced 4 ton hay per acre in 1978; some grass infestation.

Pasture layout- Fenced into six pie-shaped sections with a small pen at the pivot and a narrow lane running from the pen to the northwest corner of the field where farmstead corrals were located and where the supplement was fed. Water was available at the pivot.

Irrigation- Sprinkled with a circle system. Approximately 29 in of water was pumped on and an additional 3 in came as rain.

Fertilization- 100 lb of 18-46-0 per acre

Pasture management- Harvested half the circle for hay to start the rotation and then also harvested two other pies during the summer.

Fencing- One strand of wire with a 12 volt charger

Grazing system- 6 days on each section

Type, and amount of supplement- 2.00 to 2.25 lb of sorghum grain plus poloxalene per head per day. Also, Rabon[5] systemic fly repellent was fed. For one week (August 14 to 20) the cattle were fed 50,000 IU of vitamin A per head per day. Rye hay and alfalfa hay were made available at the corral free-choice, as was salt.

[5]Rabon[R], Rabon oral larvicide, Shell Chemical Co., San Ramon, CA.

Drug dosage- Began at 7.5 g poloxalene per head per day; July 25 it was increased to 10 g per head per day.

Method of feeding supplement- The grain mixture was fed in bunks at the corral. Two ft of bunk space was allowed per animal. The cattle had to be driven into the corral as they would not come in on their own. The grain, poloxalene and Rabon were mixed in a small trailer-mounted mixer box. The hay was fed in racks.

Implant- DES

Number of cattle- 304; 88 of them were turned on the hay June 4. The remainder were turned on the hay June 15.

Stocking rate- 3.5 head per acre (initially), 3.37 head per acre average

Type, initial wt., and final wt.- Mixed steers and heifers

<u>In</u>	Shrunk wt. (3%)	- 439 lb
	Actual wt.	- 453 lb
<u>Out</u>	Shrunk wt. (3%)	- 536 lb
	Actual wt.	- 553 lb

Number of days- 80; June 9 to August 28

ADG- 1.25 lb

Death loss- From bloat -- 11

From other -- 10

The reason for harvesting two of the pies for hay during the summer was that the stocking rate was not heavy enough, so the alfalfa was growing faster than the cattle were able to harvest it. Supplemental vitamin A was fed due to watery eye problems. It was thought that high nitrates in the alfalfa were inhibiting vitamin A utilization. The eyes seemed to clear up after it was fed. Hay was kept available to help inhibit bloat.

The poloxalene dosage was stepped up as the cattle gained weight. Nine of the eleven which died from bloat died after getting out into immature alfalfa during the night.

Table 5. Economic analysis for Kane - 1979.

	Per Head	Per Acre
Expenses		
1) Poloxalene 7.5 to 10 g levels = 3.01 lb x $2.05/lb =	$6.17	$20.79
2) Milo 2.23 lb/day x 80 days x 4¢/lb =	6.82	22.98
3) Rabon 3.38 lb x 50¢/lb	1.64	5.53
4) Hay alfalfa hay - 4 tons x $60/ton = $240; rye hay - 4 tons x $35/ton = 140		
÷ 293 hd =	1.30	4.38
5) Salt	.05	.17
6) Interest on cattle $3430.94 ÷ 293 hd =	11.71	39.46
7) Labor $3/hr x 3 hr/day x 80 days ÷ 293 hd =	2.46	8.29
8) Irrigation and depreciation $12/acre x 87 acres		
÷ 293 hd =	3.56	12.00
9) Alfalfa stand 6 yr life $5.19/acre	1.54	5.19
10) Fertilizer 100 lb/acre of 18-46-0 x 87 acres		
x $265/ton ÷ 293 hd =	3.93	13.25
11) Medication $760 ÷ 293 hd =	2.59	8.73
12) Implant	.50	1.69
13) Death loss 11 hd @ $450/hd ÷ 293 hd =	16.89	56.92
14) Land and taxes $7830 - land 87 acres x $90/		
acre + $174 - taxes ÷ 293 hd =	27.32	92.00
15) Fencing and cattle equipment 5¢/hd/day x 80 =	4.00	13.48
16) Cost of harvesting hay on half and 2 pies		
1 ton/acre $19/ton x 72.5 ÷ 87 ÷ 293 =	4.70	15.83
17) Transportation $810 ÷ 293 =	2.76	9.30
	$97.94	$329.99
Income		
1) Est 1 ton of hay /acre taken off by cattle after August 28 87 ton x $60/ton =	17.80	60.00
2) Est 1 ton of hay/acre taken off on ½ + 1/3 of field 72.5 ton x $60/ton =	14.84	50.00
3) Est Pay wt 553 x 85¢ =470.05; Initial wt 453 x 93.75¢ =424.69; 45.36	45.36	152.86
	$78.00	$262.86
NET PROFIT OR LOSS	- $19.94	-$ 67.13

Experimental Procedures and Results and Discussion for Pawnee Beefbuilders - 1979

Location- South of Larned, Kansas -- custom feeder

Acreage- 369

Soil type- Sandy

Description of pasture- 3 hilly circles; north, very sparse stand that contained an appreciable amount of wheat during the first 3 wk; middle and south were good stands-each produced 5 ton hay per acre in 1978.

Pasture layout- Each circle was fenced into six pie-shaped sections with pens at the pivots where supplement was fed and water was provided

Irrigation- Sprinkled with circle systems; sprinklers were run over cattle

	From irrigation pump	From rain
north	26 in	5 in
middle	28 in	5 in
south	26 in	5 in

Fertilization- None

Pasture management- Alfalfa was in pre-bloom when the cattle went on pasture.

Fencing- One strand of wire with a 12 volt charger

Grazing system- 5 to 6 days on each pie

Type and amount of supplement- First set of cattle: 1.00 lb corn grain, 2.00 lb silage, .50 lb poloxalene carrier, .50 lb mineral supplement, 150 mg Rumensin. Second set of cattle; same as the first except added 150,000 IU vitamin A per head per day and silage was discontinued.

Drug dosage- 6 g poloxalene per head per day

Method of feeding supplement- The supplement was fed once daily in the afternoon in feed bunks at the pivot. One ft of bunk space was allowed per head.

Implant- Ralgro

Number of cattle- First set:

	north	middle	south
First set:	202 steers	460 steers	411 heifers

6 were removed during the grazing period.

8 died during the grazing period; all from bloat.

	north	middle	south
Second set:	205 heifers	370 steers	428 steers

30 were removed during the grazing period.

31 died during the grazing period: 1 from bloat.

Stocking rate- 2.62 head per acre (initially), 2.58 head per acre average

Type, initial wt., and final wt.- Mixed breeds; "In" and "Out" average weights per head were not available, only total weight gained.

Number of days- 121; April 30 to July 4 and July 15 to September 26

ADG-

	north	middle	south
First set	1.65 lb	1.65 lb	1.20 lb
Second set	.90 lb	.90 lb	.90 lb

Total ADG = 1.20 lb

Death loss- From bloat -- 9

From other -- 30

No deleterious effects were noticed from watering over the cattle. The cattle readily came in to the feeding area to consume the supplement. The high death loss on the second set of cattle was due to a respiratory problem.

Table 6. Economic analysis for Pawnee Beefbuilders - 1979.

		Per Head
Expenses		
1)	Poloxalene 6 g level 1.83 lb/hd x $2.05 =	$ 3.75
2)	Corn 69.3 lb/hd x 6¢/lb =	4.16
3)	Silage 68.9 lb/hd x 1.3¢/lb =	.90
4)	Mineral supplement 34.65 lb/hd x 14.65¢/lb =	5.08
5)	Salt	.05
6)	Labor 6 hr/day x 139 days x $3/hr ÷ 2037 hd =	1.23
7)	Pasture rent 20¢/lb gain x 169,397 lb ÷ 2037 hd =	16.63
8)	Medication	.10
9)	Implant	1.00
10)	Death loss (figured into cattle pay weight)	
11)	Fencing and cattle equipment 5¢/hd/day x 69.3 days =	3.47
12)	Feed truck fuel 8 miles/day x 139 days ÷ 5miles/gal x 85¢/gal ÷ 2037 =	.09
		$36.46
Income		
1)	169,397 lb x 35¢/lb ÷ 2037 =	$29.11
	NET PROFIT OR LOSS	- $ 7.35

Experimental Procedures and Results
and Discussion for Sallee - 1979

Location- Northwest of St. John, Kansas -- farmer; operated as a custom feeder in this case.

Acreage- 66

Soil type- Sandy

Description of pasture- Hilly half circle; very lush stand; cooperator claimed it produced 5 ton hay per acre in 1978, but it appeared better than that.

Pasture layout- Fenced into six pie-shaped sections with approximately 2 acres fenced in the center where water was available and the supplement was fed.

Irrigation- Sprinkled with a circle system. Approximately 12 in of water was pumped on and an additional 6 in came as rain.

Fertilization- None

Pasture management- Harvested 33 acres for hay at the outset to get the rotation started. Had trouble keeping cattle in the desired pie. The cattle were locked in the catch pen at the pivot from June 27 until July 3 during wheat harvest.

Fencing- One strand of wire with a 12 volt charger

Grazing system- 5 days on each pie

Type and amount of supplement- Poloxalene through molasses was intended to be consumed at 2.00 lb per head per day. Sudan (weathered) hay bales and grain sorghum stalks in stacks were made available free-choice at the pivot. A commercial pelleted grain mixture was fed through a self-feeder during the seven day wheat harvest. The cattle consumed 4.50 lb per head per day of this mix. Salt was available free-choice.

Drug dosage- 12 g per head per day of poloxalene assuming the cattle each consumed 2.00 lb of molasses

Method of feeding supplement- Poloxalene was fed through four lick tanks. Three of them had three wheels and one had four wheels. Three of them were situated at the pivot and one was at the outer end of the pie being grazed. The hay was fed in racks at the pivot.

Implant- None

Number of cattle- 285; 49 were removed to the feedlot on June 20.

Stocking rate- 4.30 head per acre (initially), 3.60 head per acre average

Type, initial wt., and final wt.- Mixed steers; The cattle were kept in drylot for a week after coming off alfalfa and were fed 8.00 lb of a half sorghum grain, half barley grain mixture, approximately 20.00 lb of sorghum silage per day and alfalfa hay free-choice. They were weighed at the end of that week. Therefore, no accurate information on weight gain from the pasture is available.

<u>In</u> average - 599 lb

<u>Out</u> average - 723 lb

Number of days- 69; May 24 to August 16 minus 7 days harvest time

ADG- 1.50 lb The assumption is made that the cattle would not gain more than 1.50 lb per head per day during the 7 day post-pasture period because of the stress incurred by changing, drastically, their environment and feed.

Death loss- From bloat -- 13

From other -- 1

This cooperator had trouble keeping the cattle within the plot being pastured. The growing alfalfa on the other half of the circle seemed to be an attraction.

The feeding of dry hay was an attempt to help alleviate bloating problems.

During wheat harvest, the cooperator was unable to pay proper attention to the cattle on pasture, so they were penned in the catch pen at the pivot.

Molasses intake was very erratic,from almost nothing the first day on a fresh pie, to almost 4.00 lb the last day on a pie.

Table 7. Economic analysis for Sallee - 1979.

		Per Head
Expenses		
1)	Bloat Guard Liquid 24,452 lb ÷ 235 hd (avg number for grazing period) = 104.5 x 10.2¢/lb =	$10.61
2)	Grain during wheat harvest - 7,500 lb commercial mix x 7¢/lb ÷ 235 =	2.23
	during post-pasture period - 12,432 lb milo-barley x 5¢/lb ÷ 235 =	2.65
3)	Hay during pasture period 23 tons of maize stalks @ $20/ton = 460 23 tons of sudan hay @ $20/ton = 460 $920 ÷235 =	3.91
	during post-pasture period 6.7 tons alfalfa hay @ $60/ton = 402 15.5 tons sorghum silage @ $18/ton = 279 $681 ÷ 235 =	2.90
4)	Salt	.05
5)	Labor 4 hr/day x 69 = 276 hr x $3/hr = $828 ÷ 235 =	3.52
6)	Medication $25 ÷ 235 =	.11
7)	Pasture rent 35¢/hd/day x 69 days =	24.15
8)	Death loss Sallee stood anything over 2% 9.2 hd x $490 ÷ 235 =	19.18
9)	Fencing and cattle equipment 5¢/hd/day x 69 days =	3.45
		$72.76
Income		
1)	33,006 lb gain x 35¢/lb = $11,552 ÷ 235 =	$49.16
	NET PROFIT OR LOSS	- $23.60

Experimental Procedures and Results
and Discussion for Burnett - 1980

Location- Northeast of Scott City, Kansas -- custom feeder

Acreage- 42.7 until mid-July when 27.5 more were added

Soil type- Hardland

Description of pasture- Rectangular; sloped slightly away from the catch pen. The hay stand on the 42.7 acre part was fair. It had produced 4 ton hay per acre in 1978. It was infested with Kochia weed. The hay stand on the 27.5 acre part was new, but somewhat weedy.

Pasture layout- Fenced into six rectangular-shaped sections running east-west with a catch pen along the east end where supplement was fed and drinking water was available. In mid-July, three more sections were added on the north side. Eight sections covered approximately 7.1 acres each and the section furthest north covered approximately 13.3 acres.

Irrigation- Flood irrigated. Approximately 30 in of water was pumped on and an additional 5 in came as rain.

Fertilization- None

Pasture management- Grazing was initiated during the one-tenth bloom stage of growth. The five nothern-most sections were harvested for hay in early June.

Fencing- One strand of electrified wire

Grazing system- Rotational. 5 days on a section before moving, but changed to 2 to 3 days in August due to slow regrowth and increased intake.

Type and amount of supplement- 1.20 lb corn, .08 lb wheat, .05 lb molasses, 150 mg Rumensin, 3.40 lb silage and poloxalene. Salt was fed free-choice.

Drug dosage- 10 g poloxalene per head per day.

Method of feeding supplement- The ration was mixed in a truck-mounted mixer box. It was fed in fence-line feed bunks once daily in the morning. One and one-half feet of bunk space was allowed per animal. The cattle were brought to the bunks and locked in the catch pen 1 hour before being fed. They were held in the pen until all the supplement was consumed.

Implant- Ralgro

Number of cattle- Regular customer cattle (RC): 188 at the start, minus 12 bullers, left 176 at the end of the trial. The bullers were taken out 7 days after the trial began and were not returned.

Kansas State University cattle (KSU): 30 at the start and end. Three bullers were pulled at the start and placed on grass until June 27 when they were returned to the alfalfa.

Stocking rate- 5.10 head per acre at the start, 2.93 head per acre after 12 RC bullers were removed and 27.5 acres were added.

Type, initial wt., and final wt.- Mixed steers

RC cattle : avg. "full" In wt. - 430 lb

avg. "full" Out wt. - 697 lb

KSU cattle : avg. 15 hr "shrunk" In wt. - 514 lb

avg. 15 hr "shrunk" Out wt. - 782 lb

Number of days- RC cattle: 126; May 20 to September 23

KSU cattle: 126; May 20 to September 23 plus 4 days (for KSU cattle, there were 4 days between initial weighing and going on pasture)

ADG- RC cattle: 2.12 lb

KSU cattle: 2.06 lb

Death loss- None

One-hundred tons of hay were harvested off the five northern most sections early in June.

The cattle were locked in the catch pen for one hour prior to feeding to make certain all of them were hungry when they were fed. This was done to encourage more even consumption of the supplement and hence, improve performance and bloat control.

Table 8. Economic analysis for Burnett - 1980.

		Per Head	Per Acre
Expenses			
1)	Poloxalene 10 g level 127 days x 10 g = 1270 g 1270 x 2 = 2540 ÷ 454 = 5.59 lb x \$1.76 =	\$ 9.85	\$28.86
2)	Corn 1.2 lb x 127 x 6¢/lb =	9.14	26.78
3)	Wheat .08 lb x 127 x 6¢/lb =	.71	2.08
4)	Molasses .05 lb x 127 x 6¢/lb =	.38	1.11
5)	Rumensin 150 mg x 127 x 60,000 mg/lb x \$4/lb =	1.27	3.72
6)	Silage 3.4 lb x 127 x 1.4¢/lb =	6.04	17.70
7)	Salt	.05	.15
8)	Labor \$4/hr x 2 hr/day x 127 ÷ 206 hd =	4.93	14.44
9)	Irrigation and depreciation \$15/acre x 70.2 acres ÷ 206 =	5.11	14.97
10)	Medication None	--	--
11)	Implant	1.00	2.93
12)	Land and taxes \$5365 - land \$75/acre 280 - tax \$5545 ÷ 206 =	26.91	78.85
13)	Fencing and cattle equipment 5¢/hd/day x 127 =	6.35	18.61
14)	Hay harvesting 100 ton x \$19/ton ÷ 206 =	9.22	27.02
		\$80.96	\$237.22
Income			
1)	Cattle weight gain RC cattle 46,992 x 40¢/lb = \$18,796.80 KSU cattle 8040 x 40¢/lb = \$ 3,216.00 \$22,012.80 ÷ 206 =	\$106.86	\$313.10
2)	Hay value 100 ton x \$75/ton ÷ 206 =	36.41	106.68
		\$143.27	\$419.78
	NET PROFIT OR LOSS	+ \$62.31	+ \$182.56

Experimental Procedures and Results and Discussion for Ward - 1980

Location- South of Larned, Kansas -- custom feeder

Acreage- 132

Soil type- Sandy

Description of pasture- Hilly circle; the hay stand was very good. It produced 9 ton hay per acre in 1978.

Pasture layout- Fenced into six pie-shaped sections with a pen covering approximately two acres at the pivot where the supplement was fed and drinking water was available.

Irrigation- Sprinkled with a circle system. The sprinkler was never shut off. Approximately 29 in of water was pumped on and an additional 1.50 in came as rain.

Fertilization- None in the past 4 years. Seven hundred tons of cattle manure per acre during the previous 7 years.

Pasture management- Grazing was initiated during the vegetative stage of growth. Alfalfa was mowed under the fences before moving the cattle to a new pie. The sprinkler was not run over the cattle.

Fencing- Two strands of electrified wire.

Grazing system- Rotational, 5 to 7 days on each pie.

Type and amount of supplement- 4.00 lb corn (4.00 lb of sorghum grain the first week), poloxalene, 150 mg Rumensin, 50,000 IU vitamin A, low quality wheat hay, trace mineral block and salt.

Drug dosage- 6 g per head per day of poloxalene in the beginning, but after losing several head, the dose was changed to 6 g, except, on the day before and the day of moving to a new pie at which time it was increased to 10 g per head per day.

Method of feeding supplement- The grain mixture was fed twice daily in feed bunks at the pivot. One ft of bunk space was allowed per head. Wheat hay was fed free-choice at the pivot as were the trace mineral blocks and salt.

Implant- Ralgro

Number of cattle- Regular customer cattle (RC): 434 at the start, minus 17 that died, left 417 at the end of the trial.

Kansas State University (KSU): 30 at the start, minus 1 which had to be removed from the trial due to a severe injury, left 29 at the end of the trial.

Stocking rate- 3.52 head per acre at the start, 3.38 head per acre after 17 died and 1 injured animal was removed.

Type, initial wt., and final wt.- Mixed steers

RC cattle: avg. "full" <u>In</u> wt. - 535 lb

avg. "full" <u>Out</u> wt. - 794 lb

KSU cattle: avg. 15 hr "shrunk" <u>In</u> wt. - 503 lb

avg. 15 hr "shrunk" <u>Out</u> wt. - 692 lb

Number of days- RC cattle: 109; May 2 to August 18

KSU cattle: 94; May 16 to August 18 plus 2 days (for KSU cattle, there was a 2 day interim between initial weighing and going on pasture)

ADG- RC cattle: 2.47 lb

KSU cattle: 1.97 lb

Death loss- RC cattle: From bloat - 17 From other - 0

KSU cattle: From bloat - 1 From other - 1 (salvage from injury)

Death loss seemed to occur most frequently after a rain. Almost all the rain fell during the first part of the trial. After several head were lost, the dosage of poloxalene was changed, as previously explained. Average daily gain for the RC cattle was computed by omitting the dead cattle from the data by multiplying the number dead by their initial weight. Average daily gain for the KSU cattle was calculated by dropping the salvaged steer from the data and also by dropping from the data a steer which lost its tag.

Five foot rot cases were encountered in July.

The cattle were removed on August 18 to plow up the alfalfa and plant rye pasture.

Table 9. Economic analysis for Ward - 1980.

		Per Head
Expenses		
1)	Poloxalene 6 g for 4 days and 10 g for 2 days of 6 day rotation. 108 days x 7.33 g/day x 2 ÷ 454 x \$1.76/lb =	\$ 6.15
2)	Corn 432 lb x 6¢/lb =	25.92
3)	Sorghum grain 28 lb x 5.5¢/lb =	1.54
4)	Vitamin A and trace mineral blocks 2.5 lb x 15¢/lb =	.38
5)	Wheat hay 2 lb/day x 108 x 1¢/lb =	2.16
6)	Rumensin 150 mg x 108 ÷ 60,000 mg/lb x \$4/lb =	1.08
7)	Salt	.05
8)	Labor \$4/hr x 2 hr x 108 ÷ 446 hd =	1.94
9)	Irrigation and depreciation \$15/acre x 132 ÷ 446 x .67 =	2.97
10)	Alfalfa stand 6 years life \$5.19/acre \$5.19 x 132 ÷ 446 x .67 =	1.03
11)	Implant	1.00
12)	Death loss (figured into cattle pay weight)	--
13)	Land and taxes \$11,880 - land \$90/acre 500 - tax \$12,380 ÷ 446 x .67 =	18.60
14)	Fencing and cattle equipment 5¢/hd/day x 108 =	5.40
		\$68.22
Income		
1)	Cattle weight gain: RC cattle 103,160 x 40¢/lb = \$41,264 KSU cattle 5,481 x 40¢/lb = 2,192 \$43,456 ÷ 446 =	\$97.43
	NET PROFIT OR LOSS	+ \$29.21

Per head charges for fixed costs were reduced by one-third due to only two-thirds use of a possible 150 day grazing period. Per acre charges were not calculated because alfalfa was plowed as soon as the cattle were removed from pasture.

Experimental Procedures and Results and Discussion for Barr - 1980

Location- Dover, Oklahoma -- farmer

Acreage- 130

Soil type- Hardland

Description of pasture- Hilly rectangular field. It produced 4 ton hay per acre in 1979.

Irrigation- None; approximately 9 in of water came from rain in the first 30 days of the grazing season.

Fertilization- None

Pasture management- Grazing was started during the vegetative stage of growth.

Fencing- Permanent barbed and woven wire around the perimeter of the pasture.

Grazing system- The cattle were grazed on the entire pasture continuously.

Type and amount of supplement- 2.00 lb commercial grain cubes (corn, sorghum grain, and poloxalene), mineral (Ca-Phos) mixture free-choice and in August, 4.00 lb to 5.00 lb alfalfa hay per head per day.

Drug dosage- 10 g poloxalene per head per day

Method of feeding- The cubes were fed in bunks in the catch pen at one end of the field once a day. Two ft of bunk space was allowed per head. When hay was fed, it was placed in racks at the feed bunks. The mineral mixture was also placed there.

Implant- Ralgro

Number of cattle- Barr cattle: 575 at the start. After the initial growth was grazed off, many of these cattle were shifted to other pastures throughout the remaining grazing season.

Kansas State University (KSU): 15 at the start. 1 lost its tag, so it was dropped from the trial; 14 remained until the end of the trial.

Stocking rate- From 4.50 head per acre at the start to approximately 1.00 head per acre by September 1

Type, initial wt., and final wt.- Mixed steers

Barr cattle: 15 head were tagged at the start and were weighed intermittently throughout the first three and one-half months of the grazing season. These are all "full" weights.

May 5 -- 588 lb

June 13 -- 640 lb

July 19 -- 672 lb

August 20 -- 733 lb

October 9 -- 711 lb

KSU cattle: Beginning and ending weights are with a 15 hr shrink. Interim weights are "full".

May 5 -- 472 lb

June 13 -- 543 lb

July 19 -- 583 lb

August 20 -- 614 lb

October 17 -- 595 lb

Number of days- Barr cattle: 88 to 158; May 5 to July 3 through October 9

KSU cattle: 165; May5 to October 17

ADG- Barr cattle that were tagged: 1.34 lb from May 5 to August 20. For steers kept 158 days, ADG was .90 lb.

KSU cattle: .75 lb for the entire season

Death loss- None

Due to the grazing system used, the extreme heat (45 days of 100 F. degree days) and the lack of rain after the first week of June, the alfalfa did not produce very well after its initial growth. As a consequence many cattle had to be removed from the alfalfa.

The cost-return sheet was computed for Barr's cattle on an average of 300 head. He shifted cattle off and on the alfalfa throughout the summer. It was estimated that the average number of cattle on alfalfa at any one time was 300. Income from Barr's cattle was calculated from an average daily gain of 1.34 lb for an average of 130 days because he started selling cattle in July. This may be too high because the 15 head of tagged cattle did not gain weight the last two months.

Table 10. Economic analysis for Barr - 1980.

Expenses	Barr Per head	KSU Per head
1) Grain cubes with Bloat Guard KSU - 165 days x 2 lb/ day x 8.5¢/lb =		$28.05
Barr - 130 days x 2 lb/ day x 8.5¢/lb =	$22.10	
2) Mineral mixture KSU - 4 lb x 10¢/lb =		.40
Barr - 3 lb x 10¢/lb =	.30	
3) Alfalfa hay KSU - 4.5 lb/day x 46 days x 3.75¢/lb =		7.76
Barr - 4.5 lb/day x 20 days x 3.75¢/lb =	3.38	
4) Salt	.05	.05
5) Labor Barr and KSU		
$4/hr x 2 hr/day x 137 days ÷ 590 =	1.86	1.86
6) Alfalfa stand 6 yr life @ $5.19/acre		
590 hd ÷ 130 acres = 4.54 hd/acre		
5.19 ÷ 4.54 =	1.14	1.14
7) Implant	1.00	1.00
8) Land and taxes $6500 - land $50/acre x 130		
260 - tax		
$6760 ÷ 590 =	11.46	11.46
9) Fencing and cattle equipment 5¢/hd/day		
KSU - 165 days =		8.25
Barr - 130 days =	6.50	
10) Cattle purchases 440 lb x 87¢/lb =	382.80	
11) Interest Owned 237 days @ 15% =	37.32	
12) Feed cost from 440 lb to 588 lb		
148 x 35¢/lb =	51.80	
13) Transportation	2.50	
	$522.21	$71.59
Income		
1) KSU - .75 lb x 165 days x 40¢/lb =		$49.50
Barr - 123 lb of gain on pasture		
148 lb of gain before pasture		
440 lb "buy" weight		
711 x 71¢/lb =	$504.81	
NET PROFIT OR LOSS	- $17.40	-$22.08

Results and Discussion

The average death loss from bloat during both grazing seasons was 2% (range, 0 to 5.5%). When the cattle were kept in the desired pasture and consumption of poloxalene was regulated in the proper manner, death loss was below 1%. Less bloat was observed in cattle consuming poloxalene through grain than was observed in cattle consuming poloxalene in the liquid form, but only two producers used the liquid form. At one of these locations, product quality control was a problem and at the other location much difficulty was incurred in keeping the cattle in the desired pasture. The best form of poloxalene to use probably depends on a farmer's individual management and his own preference.

The average stocking rate during both grazing seasons for irrigated alfalfa was 3.43 head per acre with a range from 2.14 to 4.76 head per acre. The average weight of cattle ranged from approximately 400 to 600 lb. Under Kansas growing conditions, the optimum stocking rate with 400 lb cattle is probably 5.00 to 6.00 head per acre.

In agreement with Acord (1970), there was no evidence that supplementing with more than 2.00 lb of grain per head per day increased weight gain.

The average daily gain (3% pencil shrink in and out) for 1979 was 1.54 lb with a range of 1.20 to 2.00 lb. In 1980, the average daily gain (15 hr shrink in and out) for the two irrigated, rotationally grazed locations was 2.02 lb, while the average daily gain for the dryland, continuously grazed location was .75 lb. One producer in 1979 harvested 836 lb of beef per acre. None of the other locations gave good estimates due to moving cattle in and out, increasing acres in mid-season and removing the cattle long before the grazing season was over. Gains greater than 2.00 lb per head per day and 1600 lb of beef per acre have been achieved (Acord, 1970; Duren, 1973; Welty, 1979) in climates with less grazing days than in Kansas, so it appears that 2.00 lb per day and 1500 lb of beef per acre in 150 days should be within reach in this area of the High Plains. A summary of data from each cooperating producer is presented in table 11.

Average daily gain of the University cattle in 1980 appeared to increase with increasing initial frame score (table 12). No trend was apparent regarding condition score (table 13). This may have been because all the cattle were fairly thin initially. Condition is probobly an important measurement only when greater differences exist than were observed in this trial.

Ward Feedyard finished the University steers which grazed their alfalfa. They reported for a 125 day feeding period a feed conversion of 8.78 lb of air dry feed per lb of gain, and a gain of 2.98 lb per day. The feedlot manager stated that compared to similar cattle grown in the feedyard, gains were slightly lower but cost of gains were similar.

The following management recommendations are basically Cope and Petr's (1976) with our revisions and additions.

1. Give cattle access to Bloat Guard 2 to 5 days before turning them on alfalfa. This allows animals to become accustomed to the drug which needs to be present in the rumen before they are turned on alfalfa.

2. Use higher dosages of drug than are recommended when starting. If no problems occur, drug dosage may be reduced. Also, higher dosages are necessary when alfalfa is lush, and lower dosages when it is mature.

3. When cattle are turned on aflalfa for the first time, turn them on about mid-morning after they have filled on other roughage. Then leave them on pasture constantly, even at night. Never let cattle get hungry while grazing. Cattle need to be observed at least twice daily and preferably even

more often than that, particularly if some cases of bloat are being observed.

4. While pre-bloom alfalfa can be grazed with a minimum of bloat problem, use more mature alfalfa (1/10 bloom or later) when first starting.

5. Stocking rate for an established stand of alfalfa generally ranges from 5 to 6 head of 400 lb cattle per acre. The stocking rate of 5 head per acre is based on alfalfa hay production rate of 6 tons per acre.

6. Fence the pasture in 6 equal sections. Graze each section 5 days, then rotate cattle to next section. This allows 25 days for regrowth of alfalfa between grazing periods. This period has been found adequate for maintaining good stands and good production. Furthermore, 5-day grazing periods allow for only a minimum of trampling.

7. Irrigate as needed to sustain maximum production. Usually plots are watered behind the cattle so that they do not pasture wet ground. However, on well-drained, sandy soils, it is possible to water over the cattle without difficulty.

8. Excessive trampling of alfalfa during wet weather can be a problem, especially in soils where the clay content is high. Providing an area for the cattle during a wet period and offering hay can be a worthwhile conservation practice.

9. It is important to manage stocking rate and rotation interval properly. If overgrazing occurs, cattle may overeat when they are rotated to the fresh pasture and thus increase the possibility of bloat. Leave alfalfa approximately 4 in high when cattle are rotated to fresh pasture. Overgrazing also will cause increased consumption of the supplement in cases where liquid supplement is used, thus increasing expense. However, the stocking rate needs to be sufficient to insure even grazing. If uneven grazing occurs, the remaining plants become larger and less palatable. During regrazing the animals will eat the younger, more tender plants again. In effect, this will reduce

productive acreage unless the large plants are mowed.

10. Feeding dry feed, free-choice, may be advantageous in further helping reduce the incidence of bloat and reducing the rumen removal rate thus making better use of the alfalfa. Producers have used prairie hay, wheat straw, and even summer annuals quite successfully. Free-choice intake of dry feed will be about 2.00 lb per head per day or less.

11. Alfalfa that is too mature is not as palatable as immature alfalfa and will cause overconsumption of the supplement.

12. Annual fertiltzation should be based on soil needs determined by an annual soil test.

13. If flies and watery eyes are a problem, use dust bags.

14. If footrot is a problem, use organic iodine.

15. Good fencing is important. Trouble occurs when cattle get through a fence into another plot that may be very lush. Also, by breaking out of their plot, cattle may be unable to obtain the Bloat Guard supplement for an extended period of time. Remove any animals that are habitual fence breakers. Constant surveillance of fences is necessary. Electric fencing is usually employed. Some successful managers have used two strands of wire for an electric fence rather than one strand that is commonly used.

16. If liquid supplement is used to supply Bloat Guard:

   a. Place lick tanks near water or other areas where cattle congregate.

   b. Provide one lick wheel per 25 head of cattle. In addition, place at least one lick tank in the field; or in larger operations, place one wheel per 50 cattle around the field so that animals are never more than 400 yd from a lick tank.

   c. If underconsumption is a problem, place salt lick close to, or on top of, lick tanks. Close proximity to a rubbing post will increase the desirability of a loitering area.

d. Measure depth of liquid in tanks daily and move tanks from areas of low consumption to areas of high consumption.

e. Mount tanks on sleds to simplify movement of tanks with a pickup truck. This greatly increases flexibility, assuring proper location of the tanks in each field.

f. If overconsumption is a problem, reduce the number of wheels available by not filling one or more tanks or by tying down one or more wheels.

17. If Bloat Guard top dressing is used:

a. Add desired amount of drug to 2.00 lb grain and feed once or twice daily. Results have shown that the cost of the grain is returned as extra weight gain. Feeding grain twice daily insures a higher concentration of drug in the rumen for a longer period of time.

b. If irrigated circles are used, place feed bunks around periphery of catch pen which is usually located around the center pivot. Cattle can eat from both sides of bunks. Supply 1.50 to 2.00 ft of bunk space per head. If rectangular or square fields are used, build catch pen at one end of field and place bunks in a convenient place for feeding.

c. Make sure all the cattle are present at the bunks before feeding.

d. Use a palatable grain base.

e. If there are any cattle that regularly do not consume the grain, they should be removed.

18. If Bloat Guard blocks are used:

a. Accustom cattle to blocks at least 3 days before grazing alfalfa.

b. Place blocks where cattle congregate.

c. Use at least one block per 5 head of cattle.

d. Always keep adding a few fresh blocks because some cattle will not consume blocks that have been slobbered on and are stale.

e. Do not use any other mineral block or loose mineral. The *Bloat Guard* blocks contain supplemental mineral including salt.

Table 11. Summary of 1979 and 1980 alfalfa grazing trials.

	Burnett 1979	Burnett 1980	Ward 1979	Ward 1980	Mott 1979	Kane 1979	PBB 1979	Sallee 1979	Barr 1980
Total cattle no.	188	218	951	464	290	304	2076	285	590
No. of acres	37	70.2	132	132	132	87	396	66	130
Avg stocking ratec cattle/ acre	4.76	2.93	4.65	3.38	2.14	3.37	2.58	3.60	2.31
ADG, lb	1.77	2.06	1.52	1.97	2.00	1.25	1.20	1.50	.75
Avg lb beef/ acre792	792	761	841	719	424	337	374	373	237
Avg no. of days	94	126	119	108	99	80	121	69	137
Starting date	June 4	May 20	May 18	May 16	May 18	June 9	April 30	May 24	May 5
Avg amount of hay harvested, tons/acre	1.75	1.4	1.0	-	-	.8	-	-	-
Death loss due to bloat, %	0	0	<1	3.7	5.5	3.6	<1	4.6	0
Poloxalene amount, g	10	10	7.5	7.33[a]	10	8.75[b]	6	12	10
vehicle, G=grain L=liquid	G	G	G	G	L	G	G	L	G
Supplemental feed/hd/day[c], lb	3.46	2.63	6.00	6.00	4.90	2.80	2.54	6.00	2.01
Profit (P) or loss (L)	P	P	L	P	L	L	L	L	L

[a]6 g per head per day until several deaths occurred and then the dosage was changed to 6 g except the day before and day of rotating to a new pie.

[b]7.5 g for 40 days and 10 g for 40 days.

[c]Silage converted to 90% dry matter. All other supplements, including liquid supplements, averaged at original moisture level.

Table 12. Mean *gain and final frame score as* influenced by initial frame score[1] (1980).

	Initial frame score	Number of animals	ADG, lb	SD	Final frame score	SD
Barr	1	6	.67	.31	2.67	.52
	2	6	.77	.15	3.50	.84
	3	2	.89	.16	5.50	.71
Ward	1	13	1.80	.29	2.85	.56
	2	9	2.05	.15	4.33	1.00
	3	6	2.27	.21	5.00	1.10
Burnett	1	9	2.06	.15	3.33	.50
	2	15	2.01	.23	4.53	1.06
	3	6	2.21	.32	6.17	.98

[1]The frame scale used was 1 to 10; 1 represented very small and 10 represented very large.

Table 13. Mean gain and final condition score as influenced by initial condition score[1] (1980).

Initial condition score	Number of animals	ADG. lb	SD	Final condition score	SD
4	3	.55	.23	4.00	0
5	9	.77	.21	5.00	0
6	1	.80	-	7.00	-
7	1	1.08	-	7.00	-
3	2	1.74	.42	4.50	.71
4	10	2.07	.27	5.80	.92
5	9	2.06	.27	6.11	.78
6	7	1.81	.30	6.14	.38
3	1	2.26	-	4.00	-
4	11	2.06	.15	5.82	.41
5	13	2.08	.26	5.85	.56
6	5	1.98	.33	6.60	.89

[1]The condition score used was 1 to 10; 1 represented very thin and 10 represented very fat.

Economic Analysis

Many factors are important in determining the profitability of a stocker cattle program on irrigated pasture. Cope and Petr (1976) and Heinemann and Rogers (1973) gave these as among the most important:

1. purchase and sale price of animals
2. pasture and livestock productivity
3. cost of producing pasture.

Heinemann and Rogers (1973) stated that on irrigated pasture, to obtain a 7% return on money invested, no more than a 4 cents per lb negative spread between stocker and feeder prices could be allowed. Cope and Petr (1976) observed a $109 per acre net profit on irrigated alfalfa pasture resulting from a 5 cent per lb negative spread. They also noted that a 5 cent per lb decrease in both stocker and feeder prices reduced per-acre returns to $36. Cope (1974) found that with a $4 rollback in cattle price and gains of 2.29 lb per day, a net profit of $33.35 per head resulted. But with the same gain and a $13 rollback, he would have lost $38.74 per head.

The three profit determining factors stated by Cope and Petr (1976) and Heinemann and Rogers (1973) were found to exist in the analysis of our data. An additional determinant noted was interest rate on money borrowed for cattle purchases or operating capital. In Barr's case (Table 10), at 7% interest (the rate used by Heinemann and Rogers, 1973) he would have made a profit of $2.50 per head even with an average daily gain of 1.90 lb. As noted in the analysis of his operation, at 15% interest, he lost $17.40 per head.

Some major determinants of profit or loss are listed for each location in Table 12.

Table 12. Some determinants of profit or loss.

	Profit or loss/hd	Feed/hd	Pasture production/hd[1]	Interest /hd	Death /hd	Charge to customer	Average daily gain (lb)
1979							
Burnett	+$29.95	$24.25	$19.75	---	---	40¢/lb	1.77
Ward	-$ 1.42	$26.24	$15.41	---	negligible	35¢/lb	1.52
Mott	-$38.03	$29.64	$32.12	$21.98	$ 1.71	---	2.00
Kane	-$19.94	$15.98	$36.35	$11.71	$16.89	---	1.25
PBB	-$ 7.35	$13.94	$16.63	---	negligible	35¢/lb	1.20
Sallee	-$23.60	$22.35	$24.15	---	$19.18	35¢/lb	1.50
1980							
Burnett	+$62.31	$27.44	$32.02	---	---	40¢/lb	2.06
Ward	+$29.21	$37.28	$22.60	---	$ 3.30	40¢/lb	1.97
Barr	-$17.40	$25.83	$12.60	$37.32	---	40¢/lb	.75

[1] Alfalfa stand, irrigation and depreciation, land and taxes, fertilizer, and pasture rent.

TRIAL I. PASTURE AND CATTLE MANAGEMENT WHILE GRAZING ALFALFA

Summary

Alfalfa grazing techniques were observed at six locations in Kansas in 1979. A total of 4050 head of cattle with an average initial weight of 500 lb were included in the trials.

In 1980, Kansas State University placed 75 head of mixed breed cattle with average initial wieght of 502 lb on three grazing locations in Kansas and Oklahoma to better determine actual weight gains. They were also visually scored for frame and condition prior to and at the end of each grazing trial. Both scales were from 1 (very small or very thin) to 10 (very large or very fat) for frame and condition, respectively.

Death from bloat during both seasons ranged from 0 to 5.5%. When the cattle were kept in the desired pasture and consumption of poloxalene was regulated properly, death due to bloat was below 1%.

The stocking rate for irrigated alfalfa for both grazing seasons ranged from 2.20 to 4.80 head per acre. Under Kansas growing conditions, the optimum stocking rate with 400 lb cattle is probably 5 to 6 head per acre.

Average daily gains in 1979 ranged from 1.20 to 2.00 lb. In 1980, the average daily gain on the irrigated, rotationally grazed locations was 2.02 lb and on the dryland, continuously grazed location was .75 lb. A good seasonal gain-per-acre figure could not be established, because in some cases cattle were moved in and out, number or acres were changed in mid-season, or cattle were moved off the pasture long before the grazing season was over. It appears that in Kansas, 2.00 lb gain per day and 1500 lb of beef per acre in 150 days

is possible.

Average daily gain increased with increasing initial frame score. No trend was apparent with respect to condition score.

Factors found to be most important in determining the economic outcome of an alfalfa grazing program were: purchase and sale price of animals, interest rate on money borrowed for cattle purchases or operating capital, pasture and livestock productivity, and cost of producing pasture.

Literature Cited

Acord, C. R. 1969. Beef production on irrigated pastures. Utah Sci. 30:7.

Acord, C. R. 1970. Alfalfa pastures compare favorably with grass-legume pastures and other feed crops in Utah. Utah Sci. 31:7.

Acord, C. R., J. E. Butcher, and D. W. Thomas. 1969. Bloat on dry alfalfa hay and legume pasture. Utah Sci. 30:3.

Alexander, C. L., R. M. Meyer, and E. E. Bartley. 1969. Rumen removal rates of some chemically defined fractions of ^{14}C-labeled alfalfa. J. Anim. Sci. 29:746.

Ayre-Smith, R. A. 1971. Pasture bloat in cattle. Australian Vet. J. 48:162.

Barrentine, B. F., C. B. Shawver, and L. W. Williams. 1956a. Antibiotics for the prevention of bloat in cattle grazing ladino clover. J. Anim. Sci. 15:440.

Barrentine, B. F., C. B. Shawver and L. W. Williams. 1956b. Experimental bloat studies. p. 16-23. Proc. Cornell Nutrition Conf. Feed Manufacturers.

Barrentine, B. F., C. B. Shawver, L. W. Williams and R. E. Deese. 1957. Field Testing of a Penicillin-salt Mixture for the Prevention of Bloat in Cattle Grazing Legume Pastures. Mississippi Agr. Exp. Sta. Inf. Sheet 549.

Bartley E. E. 1965a. An analysis of the bloat complex and progress towards its prevention. J. Amer. Vet. Med. Assoc. 147:1397.

Bartley E. E. 1965b. Bloat in cattle. VI. Prevention of legume bloat with a nonionic surfactant. J. Dairy Sci. 48:102.

Bartley E. E. 1967. Progress in bloat prevention. Agr. Sci. Rev. 5(1):5.

Bartley E. E. 1974. Legume, feedlot and wheat pasture bloat. p. 120-128. Nutr. Diseases, Annu. Conf. Vet., Kansas State Univ., Manhattan, KS.

Bartley E. E., H. Lippke, H. B. Pfost, R. J. Nijweide, N. L. Jacobson, and R. M. Meyer. 1965. Bloat in cattle. X. Efficacy of poloxalene in controlling alfalfa bloat in dairy steers and in lactating cows in commercial dairy herds. J. Dairy Sci. 48 1657.

Bartley E. E., S. F. Scheidy, and L. V. Curtin. 1972. Free-choice feeding of a liquid supplement 'Bloat Guard' (poloxalene) mixture for bloat control. Proc. Anim. Ind. Res. Conf., Kansas City, MO.

Bateman, G. Q., and W. Keller. 1956. Grass-legume Mixtures for Irrigated Pastures for Dairy Cattle. Utah Agr. Exp. Sta. Bull. 382.

Brown, L. R., R. H. Johnson, R. S. Allen, N. L. Jacobson, and P. G. Homeyer. 1957. The relationship of plant composition, rumen fluid characteristics and weather to the incidence and severity of bloat. J. Anim. Sci. 16:1054.

Brown, L. R., R. H. Johnson, N. L. Jacobson, and P. G. Homeyer. 1958. Effect of administration of oils and of penicillin on incidence and severity of bloat and certain other responses of cattle. J. Anim. Sci. 17:374.

Bryant, H. T., R. E. Blaser, R. C. Hammes, Jr., and W. A. Hardison. 1961. Method for increasing milk production with rotational grazing. J. Dairy Sci. 44:1733.

Bryant, H. T., R. E. Blaser, R. C. Hammes, Jr., and J. P. Fontenot. 1970. Symposium on pasture methods for maximum production in beef cattle: Effect of grazing management on animal and area output. J. Anim. Sci. 30:153.

Clanton, D. C., and J. T. Nichols. 1973. Irrigated pastures. In M. E. Heath, D. S. Metcalfe, and R. F. Barnes (Ed) Forages. Third Ed. Iowa State Univ. Press, Ames. p. 627-638.

Clarke, R. T. J., and C. S. W. Reid. 1970. Legume bloat. In A. T. Phillipson (Ed.) Physiology of Digestion and Metabolism in the Ruminant. Oriel Press, Newcastle upon Tyne, England. p. 599-606.

Cole, H. H., S. W. Mead, and W. M. Regan. 1943. Production and prevention of bloat in cattle on alfalfa pasture. J. Anim. Sci. 2:285.

Cole, H. H., and J. M. Boda. 1960. Continued progress toward controlling bloat. A review. J. Dairy Sci. 43:1585.

Coleman, S. W., and K. M. Barth. 1972. Factors affecting grazing selection. J. Anim. Sci. 34:357.

Colvin, H. W., Jr., P. T. Cupps, and H. H. Cole. 1958. Efficacy of oat hay as a legume bloat preventive in cattle. J. Dairy Sci. 41:1557.

Cope, G. E. 1974. Goal: Ton of beef per acre from irrigated alfalfa. Irrigation Age. p. 6-7. Sept.

Cope, G. E., and F. C. Petr. 1976. Bloat Control of Animals Grazing on Alfalfa Pasture. Texas Agr. Ext. Serv. Fact Sheet. L- 1496.

Davis, R. R., and A. D. Pratt. 1956. Rotational Versus Continuous Grazing with Dairy Cows. Ohio Exp. Sta. Bull. 778.

Duren, E. 1973. Managing Beef Cattle on Improved Irrigated Pastures. Idaho Coop. Ext. Serv. and Agr. Exp. Sta. Current Inf. Series. 198.

Edmond, D. B. 1963. Effects of treading on perennial ryegrass and white clover pastures in winter and summer at two moisture levels. New Zealand J. Agr. Res. 6:265.

Edmond, D. B. 1970. Effects of treading on pastures using different animals and soils. Proc. Eleventh Int. Grassl. Congr. Surfers Paradise, Queensland, Auatralia. p. 607.

Ensminger, M. E., H. G. McDonald, A. G. Law, E. J. Warwick, E. J. Kreizinger, and V. B. Hawk. 1944. Grass and Grass-Alfalfa Mixtures for Beef Production in Eastern Washington. Washington Agr. Exp. Sta. Bull. 444.

Essig, H. W.,and C. B. Shawver. 1968. Methods of administration of poloxalene for control of bloat in beef cattle grazing ladino clover. J. Anim. Sci. 27:1669.

Feed Additive Compendium. 1980. Vol. 18. Miller Publishing Co. Minneapolis, MN.

Foote, L. E., R. E. Girouard, Jr., J. E. Johnston, J. Rainey, P. B. Brown, and W. H. Willis. 1968. Poloxalene for prevention of legume bloat. J. Dairy Sci. 51:584.

Fuelleman, R. G., W. L. Burlison, and W. G. Kammlade. 1948. Methods of management of a bromegrass-alfalfa mixture. J. Anim. Sci. 7:102.

Gross, G., and K. Matheson. 1964. Irrigated pastures produce high beef gains. Crops Soils. 17(3):22.

Hanson, C. H.,and D. K. Barnes. 1973. Alfalfa. In M. E. Heath, D. S. Metcalfe, and R. F. Barnes (Ed.) Forages. Third Ed. Iowa State Univ. Press, Ames. p. 136-147.

Hardison, W. A., J. T. Reid, C. M. Martin, and P. G. Woolfolk. 1954. Degree of herbage selection by grazing cattle. J. Dairy Sci. 37:101.

Heinemann, W. W. 1970. Continuous and Rotation Grazing by Steers on Irrigated Pastures. Washington Agr. Exp. Sta. Bull. 724.

Heinemann, W. W., and L. F. Rogers. 1971. Irrigated Pastures and a Bloat-Preventative Supplement for Beef Production. Washington Agr. Exp. Sta. Bull. 747.

Heinemann, W. W., and L. F. Rogers. 1973. Irrigated Pastures for Cattle in Central Washington. Washington Agr. Exp. Sta. Bull. 783.

Helmer, L. G., E. E. Bartley, and R. M. Meyer. 1965. Bloat in cattle. IX. Effect of poloxalene, used to prevent legume bloat, on milk production, feed intake, health, reproduction, and rumen fermentation. J. Dairy Sci. 48:565.

Hibbs, J. W., and H. R. Conrad. 1975. Minimum concetrate feeding for efficient milk production. Ohio Report. p. 91-94. Nov.-Dec.

Hubbard, W. A., and H. H. Nicholson. 1964. Irrigated grass-legume mixtures as summer pasture for yearling steers. Can. J. Plant Sci. 44:332.

Hull, J. L., J. H. Meyer, and R. Kromann. 1961. Influence of stocking rate on animal and forage production from irrigated pasture. J. Anim. Sci. 21:46.

Hull, J. L., J. H. Meyer, G. P. Lofgreen, and A. Strother. 1957. Studies on forage utilization by steers and sheep. J. Anim. Sci. 16:759.

Hull, J. L., C. A. Raguse, and D. W. Henderson. 1971. Further studies on continuous and rotational grazing of irrigated pastures by yearling beef steers and heifers. J. Anim. Sci. 32:984.

Ittner, N. R., G. P. Lofgreen, and J. H. Meyer. 1954. A study of pasturing and soiling alfalfa with beef steers. J. Anim. Sci. 13:43.

Jacobs, J. A. 1952. The performance of six grasses growing alone and in combination with legumes with differential nitrogen and phosphate fertilization in a Yakima Valley pasture. Agron. J. 44:573.

Johnson, R. H., L. R. Brown, R. S. Allen, N. L. Jacobson, and P. G. Homeyer. 1958a. Further observations on bloat etiology, prophylaxis, and therapy. J. Anim. Sci. 17:1219.

Johnson, R. H., L. R. Brown, R. S. Allen, N. L. Jacobson, and P. G. Homeyer. 1958b. Effectiveness and practicability of some oils, penecillin, n-decyl alcohol, and lecithin in the control of alfalfa bloat. J. Anim. Sci. 17:893.

Johnson, R. H., P. A. Hartman, L. R. Brown, H. H. Van Horn, and N. L. Jacobson. 1959. Sustained prevention of bloat by antibiotics in rotation or in combination. J. Anim. Sci. 18:1500.

Knight, W. E. 1979. Nutritive value and management of legume and legume-grass pastures for growing dairy and beef animals. A.D.S.A. Annu. Meeting Divisional Abstr. 62(suppl. 1):213.

Kopland, D. V., A. H. Post, and R. E. Stitt. 1954. Irrigated Pasture Investigations. Montana Agr. Exp. Sta. Bull. 496.

Lake, R. P., R. L. Hildebrand, D. C. Clanton, and L. E. Jones. 1974. Limited energy supplementation of yearling steers grazing irrigated pasture and subsequent feedlot performance. J. Anim. Sci. 39:827.

Marten, G. C. 1970. Temperature as a determinant of quality of alfalfa harvested by bloom stage or age criteria. Proc, Eleventh Int. Grassl. Congr. Surfers Paradise, Queensland, Australia. p. 506-509.

Mascola, J. J., K. M. Barth, and H. A. Fribourg. 1971. Relation of stage of maturity and plant height to in vitro digestibility of buffalo alfalfa. Tennessee Farm Home Prog. Rep. 80.

Meyer, J. H., G. P. Lofgreen, and N. R. Ittner. 1956. Further studies on the utilization of alfalfa by beef steers. J. Anim. Sci. 15:64.

Meyer, R. M., E. E. Bartley, and C. E. Deyoe. 1965a. Bloat in cattle. VII. Relation to amino acid composition of alfalfa as affected by maturity. J. Dairy Sci. 48:216.

Meyer, R. M., L. G. Helmer, and E. E. Bartley. 1965b. Bloat in cattle. VIII. Extent of elimination in milk and body tissues of ^{14}C-labeled poloxalene used to prevent legume bloat. J. Dairy Sci. 48:505.

Miller, D. F. 1958. Composition of Cereal Grains and Forages. National Academy of Science-National Research Council Publ. 585.

Mishra, B. D. 1964. Relation of rumen mucinolytic bacteria and of rumen protozoa to bloat in cattle. PHD Thesis. Kansas State Univ., Manhattan, KS.

Moore, R. A. 1970. Symposium on pasture method for maximum production in beef cattle: Pasture systems for a cow-calf operation. J. Anim. Sci. 30:133.

Nichols, R. E., and D. C. Deese. 1966. Bloat producing capacity and pectin methyl esterase activity of alfalfa stands of various moisture levels. Amer. J. Vet. Res. 27:625.

NRC. 1976. Nutrient Requirements of Domestic Animals, No. 4. Nutrient Requirements of Beef Cattle. Fifth Revised Ed. National Academy of Science-National Research Council, Washington, D. C.

Peterson, R. G., W. W. Woodhouse, Jr., and H. L. Lucas. 1956. The distribution of excreta by freely grazing cattle and its effect on pasture fertility: II. Effect of returned excreta on the residual concentration of some fertilizer elements. Agron. J. 48:444.

Pretzer, D. D. 1979. Cash Rental Rates by Crop Reporting Districts: 1972-1979.

Pretzer, D. D. 1980. Center Pivot Irrigated Alfalfa. Kansas State Univ. Farm Management Guide. MF-584.

Producers Grain Corporation. P. G. C. Bloat Guard Mineral. Amarillo, Texas.

Rather, H. C., and A. B. Dorrance. 1938. A study of the time of pasturing alfalfa. Amer. Soc. Agron. J. 30:130.

Reinhardt, L. R., H. L. Brooks, D. R. Hay, E. B. Nilson, D. H. Rogers, D. A. Whitney, V. H. Peterson, and W. G. Willis. 1978. Alfalfa Production. Kansas Ext. Serv. Publ. C-148.

Robertson, J. A., D. A. Cooke, and S. E. Beacom. 1979. A comparison of four systems of managing yearly beef steers on rotationally grazed bromegrass-alfalfa pasture. Can. J. Anim. Sci. 59:519.

Rogers, D. H.,and D. R. Hay. 1978. Irrigating Alfalfa. Kansas Ext. Serv. Agr. Facts. AF-2.

Rohweder, D. A.,and W. C. Thompson. 1973. Permanent pastures. <u>In</u> M. E. Heath, D. S. Metcalfe, and R. F. Barnes (Ed.) Forages. Third Ed. Iowa State Univ. Press, Ames. p. 596-606.

Salter, R. M., and C. J. Schollenberger. 1939. Farm Manure. Ohio Agr. Exp. Sta. Bull. 605.

Schlender, J. R., and L. Figurski. 1980. Custom Rates for Farm Machine Operations in Kansas. Kansas State Univ. Farm Management Guide. MF-470.

Spivey, W. B. 1971. Alfalfa Grazing Returns-$387 Per Acre. Intermountain Ag. California Agr. Ext. Serv. Dec. 10.

Stiles, D. A., E. E. Bartley, S. B. Erhart, R. M. Meyer, and F. W. Boren. 1967. Bloat in cattle. XII. Efficacy of molasses-salt blocks containing poloxalene in control of alfalfa bloat. J. Dairy Sci. 50:1437.

Stroupe, P. J., G. M. Ward, E. E. Bartley, R. M. Bechtle, G. L. Posler, and H. J. Muncrief. 1978. Weight gain and nutrient intake of Holstein heifers fed 25 or 35-day alfalfa pasture or alfalfa hay. J. Dairy Sci. 61:331.

Van Keuren, R. W., and W. W. Heinemann. 1958. A comparison of grass-legume mixtures and grass under irrigation as pastures for yearling steers. Agron. J. 50:85.

Van Keuren, R. W., and G. C. Marten. 1972. Pasture production and utilization. In C. H. Hanson (Ed.) Alfalfa Science and Technology. Amer. Soc. Agron. Monograph No. 15. Madison, Wisconsin. p. 641.

Welty, L. E. 1979. Evaluation of Four Irrigated Pastures for Beef Production. Montana Exp. Sta. Bull. 714.

Western Ranch Products, Inc. Western Bloat-trol Mineral Mixture (medicated). Gering, Nebr.

TRIAL II. EFFECT OF POLOXALENE AND MONENSIN ALONE AND IN COMBINATION ON FEEDLOT BLOAT

Introduction and Literature Review

Feedlot bloat does not usually cause sudden death as does legume bloat, but it can often mean the difference between profit and loss to the feeder. Feedlot bloat develops slowly (usually over the last half of the feeding period when cattle are fed large quantities of grain and small quantities of roughage) and often becomes chronic. The loss to the feeder is in the form of reduced gain. One survey reported bloat as a problem in 32% of the replies (Beef, 1971) and Meyer's (1972) survey suggested that nearly half the cattle in Kansas feedlots would be given a bloat preventive if it were available. Prevention may improve feed efficiency and relieve management problems associated with bloat (Meyer, 1972).

Feedlot bloat and legume bloat are similar in that a stable froth is produced in both which covers the cardia and prevents eructation. However, the cause of the froth in each is different.

In legume bloat, the main cause appears to be soluble plant proteins (Bartley and Bassette, 1961; Johns, 1954; Mangan, 1959; McArthur et al., 1964). In feedlot bloat, a polysaccharide slime produced by the sluffing off of encapsulated rumen microorganisms such as Streptococcus bovis aids in froth formation under lower pH conditions (Bryant et al., 1961; Gutierriz et al., 1959; Hobson and MacPherson, 1953; Lindahl et al., 1957; Meyer and Bartley, 1971) Ration form has an effect also. The finer the grind (Hironaka et al., 1973; Lindahl et al., 1957), the greater the propensity a ration has for producing bloat. Individual animal susceptibility may also be a factor

(Bartley et al., 1975; Lindahl et al., 1957).

Antihistamine (Meyer et al., 1973) vegetable oil, mineral oil, animal fat (Elam and Davis, 1962) and penicillin (Brown et al., 1958) have been tried as feedlot bloat preventives. These have met with little success and in some cases increased bloat.

Meyer and Bartley (1972) reported the development of a drug which prevents feedlot bloat, but it has not as yet been approved by the Food and Drug Administration. Frebling et al. (1971) reported a significant decrease in the incidence and severity of bloat and an increase in intake and average daily gain when feeding poloxalene[1] in concentrated rations to young bulls. Bartley and Meyer (1967) also found that poloxalene will reduce the severity of feedlot bloat. Oxytetracycline is approved by the Food and Drug Administration for control of feedlot bloat (Feed Additive Compendium, 1980), however, it does not prevent bloat (Bartley et al., 1975).

Monensin[2] was cleared in 1976 for the purpose of improving feed efficiency in cattle (Feed Additive Compendium, 1976). Raun (1974) stated that monensin reduced ruminal froth in cattle which might be one reason why monensin improved feed conversion. Also, it has been postulated by feedlot managers and nutritionists that monensin may reduce the incidence of bloat in commercial feedlots.

This information prompted a study of the effects of monensin, poloxalene, or a monensin-poloxalene combination on feedlot bloat and animal performance.

[1]Bloat Guard, poloxalene, Smith-Kline Animal Health Products, Philadelphia, PA.

[2]Rumensin, monensin sodium, Elanco Division, Eli Lilly and Co., Indianapolis, IN.

Materials and Methods

Seventy-two head of Hereford steers averaging 302 kg were purchased from one ranch to assure similar genetic and nutritional background. The steers were fed .908 kg of rolled sorghum grain, .454 kg of soybean meal and prairie hay *ad libitum* for 21 days before the trial was begun. At the start of the trial (day 0), all steers were weighed individually after being kept off feed and water for 15 hr. They were then randomly allotted by weight to four treatments with three replicates per treatment. The treatments were control; 300 mg monensin per head per day; 17 g poloxalene per head per day; and 300 mg monensin and 17 g poloxalene per head per day.

The steers were started on feed in a four step manner; typical of normal feedlot management. They were fed rations one, two and three in sequence (table 1) for 7 days each and then ration four for the remaining 91 days of experiment 1. Additional protein and minerals were fed in a supplement which also served as a carrier for the experimental additives. The steers were fed to appetite twice daily in fenceline bunks. Feed refusal was weighed weekly. Cattle were weighed every 28 days.

The intended length of the trial was 120 to 150 days, but after 112 days, because the incidence and degree of bloat was minimal, experiment 1 was terminated. The cattle were weighed 15 hr after being taken off feed and water. They were then placed on a bloat-provoking ration similar to that used by Smith *et al*. (1953) and Lindahl *et al*. (1957). This was done in a three step manner. The steers were fed ration five (table 2) for 4 days, ration six for 3 days, and ration seven for the remaining 28 days of experiment 2. The supplement from ration four was used to carry experimental additives. At the end of experiment 2 the cattle were weighed 15 hr after being taken off feed and water.

Bloat was scored once daily, 3 hr post-feeding using the following scale:

0= no abnormal distention of left flank

1= slight distention of left flank to a level near the hip bone

2= left flank rounded above the hip bone

3= left flank rounded above the hip bone and right side distended to a level near the hip bone

4= left and right flanks rounded above the hip bone, skin tight with drum-like tension

5= distress symptoms evident: frequent defication and urination, muscular incoordination, protruding anus and labored breathing.

This scale was modified by breaking the scores into halves (e.g., ½, 1, 1½, 2, 2½, 3, etc.) due to the low incidence and severity of bloat which occurred.

Least squares means were obtained for average daily gain, final weight, daily dry matter intake, and number of steers bloating. These were subjected to analysis of variance using the methods of Snedecor and Cochran (1980).

Results and Discussion

Data from one steer in the monensin treatment were omitted due to a severe respiratory ailment which arose soon after experiment 1 began. Another steer in the monensin treatment sprained a leg on day 54 of experiment 1 and was moved to a pen by himself until day 62. Also, a steer in the control group was treated for footrot on day 86 of experiment 1.

Animal performance was below normal in all treatments in both experiments (table 3 and 4). In experiment 1, the control and monensin groups gained at a significantly ($P<.05$) faster rate than the monensin-poloxalene group, but not at a different rate than the poloxalene group ($P>.05$). Gains of the poloxalene and monensin-poloxalene groups were not different ($P>.05$). In experiment 2, the monensin-poloxalene group gained at a significantly ($P<.10$) faster rate than the monensin or poloxalene groups, but not faster than the control group ($P>.10$). Gains of the control, monensin and poloxalene groups were not different ($P>.10$).

As expected (Perry _et al._, 1976; Raun, 1974), monensin reduced feed intake (although not significantly). However, feed intake was subnormal in all treatments (tables 3 and 4). Feed intake fluctuated greatly from week to week and sometimes from day to day. For example, pen number three of the control group consumed from 10.45 kg of air dry feed per head per day on day 31 of experiment 1 to 4.54 kg on day 33. Intake increased to 10.45 kg per head per day by day 37 and then down to 7.73 kg by day 40. This variation was typical of all treatments in both experiments 1 and 2. Most grain bloat researchers do not report feed intake problems with rations similar to those used in this study (Bartley _et al._, 1975; Jacobson _et al._, 1957; Lindahl _et al._, 1957; Smith _et al._, 1953). However, Hironaka _et al._ (1973) stated that some animals were reluctant to eat an all-concentrate diet. Also. Meiske and Goodrich (1972) stated that when an all-concentrate ration is fed, intakes may be much lower than when 5 to 10% forage is fed and Parrot et al.(1968) found that a significant reduction in intake may result when grain makes up 90% or more of the ration.

Monensin did not improve feed efficiency (tables 3 and 4). It is possible that the expected positive effect of monensin on feed conversion could not be demonstrated inasmuch as feed intake was so depressed.

Some researchers (Bartley et al., 1975; Frebling et al., 1971; Geissler and Thomas, 1966; Miller and Frederick, 1966) indicate that animal performance may be reduced by even a small amount of accumulated gas. In this study, there were no significant differences in the number of steers bloating among any of the treatments in either experiment (table 3 and 4). Regardless of treatment, when comparing individual animals that bloated with those that did not bloat, bloaters performed as well as non-bloaters. The degree of bloat attained in this study apparently was not severe enough to deleteriously affect animal performance. One other observation noted agrees with Lindahl et al.(1957): the incidence of bloat increased with time on the high-concentrate and all-concentrate diets.

Table 1. Percentage composition and proximate analysis (dry matter basis) of rations in experiment 1.

Ingredients[1,2]	Rations 1	2	3	4
Rolled corn	40.00	65.00	77.00	88.00
Dehydrated alfalfa	5.00	5.00	5.00	5.00
Sudangrass silage	50.00	25.00	13.00	2.00
Soybean meal	1.75	1.84	1.84	1.88
Urea	.32	.34	.34	.34
Salt	.30	.30	.30	.30
Dicalcium phosphate	.34	.16	.10	.10
Limestone	--	.39	.60	.87
Rolled sorghum grain	2.29	1.97	1.82	1.51
Proximate analysis				
Dry matter	59.0	74.1	81.3	88.0
Crude protein	12.5	12.3	12.2	12.1
Ether extract	3.3	3.9	4.2	4.5
Crude fiber	20.2	13.3	7.7	3.9
Nitrogen-free extract	56.7	66.9	71.8	76.2
Ash	7.2	4.9	3.7	2.7

[1]Bloat Guard treatments -- Drug added at 34 kg poloxalene per ton of supplement.

[2]Rumensin treatments -- Drug added at 692 g monensin per ton of supplement.

Table 2. Percentage composition and proximate analysis (dry matter basis) of rations in experiment 2.

Ingredients[1,2]	Rations 5	6	7
Rolled corn	74.00	65.00	59.00
Dehydrated alfalfa	15.00	19.00	21.00
Soybean meal	7.88	12.88	16.88
Urea	.34	.34	.34
Salt	.30	.30	.30
Dicalcium phosphate	.10	.10	.10
Limestone	.87	.87	.87
Rolled sorghum grain	1.51	1.51	1.51
Proximate analysis			
Dry matter	89.8	90.1	90.3
Crude protein	15.5	17.8	19.6
Ether extract	4.2	4.0	3.8
Crude fiber	5.3	6.2	6.6
Nitrogen-free extract	70.6	66.9	64.4
Ash	4.0	4.8	5.2

[1]Bloat Guard treatments -- Drug added at 34 kg poloxalene per ton of supplement.

[2]Rumensin treatments -- Drug added at 692 g monensin per ton of supplement.

Table 3. Summary of weight gain, dry matter intake, feed efficiency, and severity and incidence of bloat (experiment 1, 1-112 days.

	Control	Rumensin	Bloat Guard	Rumensin-Bloat Guard
Number of cattle	18	17	18	18
Avg initial weight, kg	300	303	303	304
Avg final weight, kg	423[a]	417[a]	411[a]	403[a]
Avg daily gain, kg	1.09[a]	1.02[a]	.97[ab]	.88[b]
Avg daily feed (dry matter)[1], kg	7.42[a]	7.02[ab]	7.11[ab]	6.71[b]
Feed (dry matter)/gain	6.80	6.89	7.35	7.65
Avg daily bloat score	.024	.022	.026	.034
Total incidence of bloat	39	38	44	65
Number of steers bloating	6[a]	8[a]	7[a]	12[a]

[1]Statistical significance was found between day 57 and day 112.

[a,b]Means on the same line with different superscripts are significantly different ($P<.05$).

Table 4. Summary of weight gain, dry matter intake, feed efficiency, and severity and incidence of bloat (experiment 2, 113-148 days).

	Control	Rumensin	Bloat Guard	Rumensin-Bloat Guard
Number of cattle	18	17	18	18
Avg initial weight, kg	423[a]	417[a]	411[a]	403[a]
Avg final weight, kg	451[a]	444[a]	438[a]	437[a]
Avg daily gain, kg	.79[ab]	.74[a]	.75[a]	.95[b]
Avg daily feed (dry matter), kg	8.57[a]	7.99[a]	8.29[a]	7.86[a]
Feed (dry matter)/gain	10.90	10.78	11.05	8.27
Avg daily bloat score	.152	.187	.188	.226
Total incidence of bloat	88	99	104	137
Number of steers bloating	14[a]	14[a]	16[a]	15[a]

[a,b]Means on the same line with different superscripts are significantly different ($P<.10$).

TRIAL II. EFFECT OF POLOXALENE AND MONENSIN ALONE AND IN COMBINATION ON FEEDLOT BLOAT

Summary

Seventy-two head of Hereford steers weighing an average of 302 kg and of similar background were used to determine the effects of monensin, poloxalene, or a monensin-poloxalene combination on feedlot bloat and animal performance. They were randomly allotted to four treatments with three replicates per treatment. The treatments were: 300 mg monensin per head per day; 17 g poloxalene per head per day; and 300 mg monensin and 17 g poloxalene per head per day.

In experiment 1, after an initial 21-day gradual change in ration composition, the steers were fed to appetite a 12.1% crude protein (dry basis) ration containing 88% rolled corn, 5% dehydrated alfalfa, 2% sudangrass silage, and 5% of a protein-mineral-drug carrier supplement. Experiment 1 was terminated after 112 days, because the incidence and degree of bloat was minimal.

After a 7-day gradual change in ration composition, the steers were then fed a bloat-provoking ration to appetite for 28 days. This ration contained (dry basis) 59% rolled corn, 21% dehydrated alfalfa, and 15% soybean meal along with the protein-mineral-drug carrier supplement used in ration four of experiment 1. This ration contained 19.6% crude protein.

Throughout both experiments, degree of bloat was scored daily on a scale of 0(no bloat) to 5(severe bloat).

Apparently, the high level of concentrate in the ration deleteriously affected feed intake and, consequently, performance, because each was

sub-normal for all treatments in both experiments. In experiment 1, the control and monensin groups gained at a faster rate ($P<.05$) than the monensin-poloxalene group, but not different from the poloxalene group ($P>.05$). In experiment 2, the monensin-poloxalene group gained at a faster rate ($P<.10$) than the monensin or poloxalene groups, but not different from the control group ($P>.10$).

There was no significant difference in the number of steers bloating in either experiment and regardless of treatment, when comparing individual animals, bloaters performed as well as non-bloaters. The degree of bloat observed apparently was not severe enough to affect animal performance.

Literature Cited

Bartley, E. E., and R. Bassette. 1961. Bloat in cattle. III. Composition of foam in legume bloat. J. Dairy Sci. 44:1365.

Bartley, E. E., R. M. Meyer, and L. R. Fina. 1975. Feedlot or grain bloat. In I. W. McDonald and A. C. I. Warner (Ed.) 4th Symposium on Ruminant Physiology. The University of England Publishing Unit, Armidale, N. S. W. 2351, Australia. p. 551-562.

Bartley, E. E., and R. M. Meyer. 1967. Feedlot bloat prevention with poloxalene. J. Anim. Sci. 26:913 (Abstr.).

Beef Market Research Report. 1971. A continuing market profile of beef readers. Beef, The Business Paper of the Cattle Industry. 1999 Shepard Road, St. Paul, Minnesota.

Brown, L. R., R. H. Johnson, N. L. Jacobson, and P. G. Homeyer. 1958. Effects of administration of oils and of penecillin on incidence and severity of bloat and certain other responses of cattle. J. Anim. Sci. 17:374.

Bryant, M. P., I. M. Robinson, and I. L. Lindahl. 1961. A note on the flora and fauna in the rumen of steers fed a feedlot bloat-provoking ration and the effect of penicillin. Appl. Microbiol. 9:511.

Elam, C. J.,and R. E. Davis. 1962. Ruminal characteristics and feedlot bloat incidence in cattle as influenced by vegetable oil, mineral oil, and animal fat. J. Anim. Sci. 21:568.

Feed Additive Compendium. 1976. Vol. 14. Miller Publishing Co., Minneapolis, Minnisota.

Feed Additive Compendium. 1980. Vol. 18. Miller Publishing Co., Minneapolis, Minnisota.

Frebling, J., P. Larvor, C. Malterre, M. Azan, J. Gaillard, and M. Hennequin. 1971. The influence of poloxalene on bloat, the amount of feed ingested, and the growth of young bulls receiving condensed rations. Annales De Zootech 20:291.

Geissler, B. R., and O. O. Thomas. 1966. Poloxalene as a bloat preventive for wintering calves on barley and alfalfa rations. J. Anim. Sci. 25:589 (Abstr.).

Gutierrez, J., R. E. Davis, and I. L. Lindahl. 1959. Characteristics of saponin-utilizing bacteria from the rumen of cattle. Appl. Microbiol. 7:304.

Hironaka, R., J. E. Miltimore, J. M. McArthur, D, R, McGregor, and E. S. Smith. 1973. Influence of particle size of concentrate on rumen conditions associated with feedlot bloat. Can. J. Anim. Sci. 53:75.

Hobson, P. N., and M. J. MacPherson. 1953. Encapsulation in rumen bacterial fractions. Nature 171:129.

Jacobson, D. R., I. L. Lindahl, J. J. McNeill, J. C. Shaw, R. N. Doetsch, and R. E. Davis. 1957. Feedlot bloat studies. II. Physical factors involved in the etiology of frothy bloat. J. Anim. Sci. 16:515.

Johns, A. T. 1954. Bloat in cattle on red clover. Part I. New Zealand J. Sci. Technol. A36:289.

Lindahl, I. L., R. E. Davis, D. R. Jacobson, and J. C. Shaw. 1957. Feedlot bloat studies. I. Animal and dietary factors. J. Anim. Sci. 16:165.

Mangan, J. L. 1959. Bloat in cattle. XI. The foaming properties of proteins, saponins, and rumen liquor. New Zealand J. Agr. Res. 2:47.

McArthur, J. M., J. E. Miltimore, and M. J. Pratt. 1964. Bloat investigations. The foam stabilizing protein of alfalfa. Can. J. Anim. Sci. 44:200.

Meiske, J. C., and R. D. Goodrich. 1972. Backgrounding for the feedlot; finishing. In D. C. Church (Ed.) Digestive Physiology and Nutrition of Ruminants. Vol. 3. O and B Books, Corvallis, Oregon. p. 150.

Meyer, R. M. 1972. Feedlot bloat. Proc. 27th Kansas Formula Feed Conf., Kansas State University, p. H1-H9.

Meyer, R. M., and E. E. Bartley. 1971. Bloat in cattle. XV. The relation of viscosity and cell-free polysaccharide content of rumen fluid to feedlot bloat. J. Anim. Sci. 33:1018.

Meyer, R. M., and E. E. Bartley. 1972. Method and preparation for controlling feedlot bloat in ruminants. U.S. Patent No. 3,686,416. U.S. Patent Office., Washington, D.C.

Meyer, R. M., E. E. Bartley, and G. W. Barr. 1973. Antihistamine-poloxalene effect on grain bloat. J. Anim. Sci. 37:351.

Miller, K. P., and E. C. Frederick. 1966. Relationship between feedlot bloat and daily gain with dairy steers. J. Anim. Sci. 25:1254 (Abstr.).

Parrot, C., H. Longhead, W. H. Hale, and B. Theurer. 1968. Effect of concentrate level on digestible energy intake with steers. J. Anim. Sci. 27:1173 (Abstr.).

Perry, T. W., W. M. Beeson, and M. T. Mohler. 1976. Effect of monensin on beef cattle performance. J. Anim. Sci. 42:761.

Raun, A. P. 1974. Ruminant feed utilization improvement. U.S. Patent No. 3,794,732. U.S. Patent Office., Washington, D.C.

Smith, C. K., J. R. Brunner, C. R. Huffman, and C. W. Duncan. 1953. Experimental production of frothy bloat in cattle. J. Anim. Sci. 12:932.

Snedecor, G. W., and W. G. Cochran. 1980. Statistical Methods. 7th Ed. Iowa State University Press, Ames, Iowa.

APPENDIX

Appendix table 1. Summary of weight gain, dry matter intake, feed efficiency and severity, and incidence of bloat (experiment 1, 1-112 days).

	Control			Rumensin			Bloat Guard			Rumensin-Bloat Guard		
	Rep.1	Rep.2	Rep.3	Rep.1	Rep.2	Rep.3	Rep.1	Rep.2	Rep.3	Rep.1	Rep.2	Rep.3
Number of cattle	6	6	6	6	6	5	6	6	6	6	6	6
Avg initial weight, kg	298	305	299	301	303	306	303	306	300	305	305	304
Avg final weight, kg	420	415	432	415	405	432	410	415	408	390	409	408
Avg daily gain, kg	1.10	.98	1.19	1.02	.91	1.12	.96	.97	.97	.77	.93	.93
Avg daily feed (dry matter), kg	7.35	7.25	7.66	7.02	6.66	7.36	6.89	7.25	7.04	6.53	6.70	6.90
Feed (dry matter) /gain	6.68	7.38	6.43	6.87	7.33	6.56	7.19	7.46	7.44	8.50	7.20	7.40
Avg daily bloat score	.001	.016	.054	.019	.013	.038	.033	.043	.031	.014	.049	.038
Total incidence of bloat	1	10	28	11	8	19	2	24	18	9	31	25
Number of steers bloating	1	3	2	3	2	3	1	4	2	3	4	5

Appendix table 2. Summary of weight gain, dry matter intake, feed efficiency and severity, and incidence of bloat (experiment 2, 113-148 days).

	Control			Rumensin			Bloat Guard			Rumensin-Bloat Guard		
	Rep.1	Rep.2	Rep.3	Rep.1	Rep.2	Rep.3	Rep.1	Rep.2	Rep.3	Rep.1	Rep.2	Rep.3
Number of cattle	6	6	6	6	6	5	6	6	6	6	6	6
Avg initial weight, kg	420	415	432	415	405	432	410	415	408	390	409	408
Avg final weight, kg	442	445	466	440	433	460	439	445	430	426	442	442
Avg daily gain, kg	.60	.82	.95	.68	.77	.77	.81	.82	.62	1.00	.92	.95
Avg daily feed (dry matter), kg	8.29	8.65	8.77	7.51	7.87	8.59	7.33	9.00	8.53	7.40	7.87	8.30
Feed (dry matter) /gain	13.92	10.51	9.28	11.01	10.24	11.18	9.06	10.94	13.79	7.44	8.53	8.78
Avg daily bloat score	.102	.141	.213	.201	.132	.236	.081	.271	.211	.148	.148	.382
Total incidence of bloat	20	28	40	39	27	33	16	50	38	30	31	76
Number of steers bloating	4	5	5	6	4	4	5	6	5	3	6	6

ALFALFA GRAZING MANAGEMENT
AND EFFECT OF POLOXALENE
AND MONENSIN ON FEEDLOT BLOAT

by

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Trial I.

Alfalfa grazing techniques were observed at six locations in Kansas in 1979 and at two locations in Kansas and one in Oklahoma in 1980. The cattle weighed approximately 500 lb at the start of the trials. Kansas State University placed 75 head of mixed breed steers averaging 502 lb at the three locations in Kansas and Oklahoma in 1980 to better determine actual weight gains. Visual scores were given each steer for frame and condition using the scale 1 (very small or very thin) to 10 (very large or very fat) for frame and condition, respectively.

Death loss due to bloat was below 1% when cattle were kept on the desired pasture and poloxalene intake was regulated properly.

Stocking rates for irrigated alfalfa were 2.2 to 4.8 head per acre. Under Kansas growing conditions, the optimum stocking rate is probably 5 to 6 head of 400 lb cattle per acre.

Average daily gains for both seasons on irrigated, rotationally grazed sites ranged from 1.20 to 2.06 lb. On the dryland, continuously grazed site it was .75 lb. Management practices of cooperators did not permit the acquisition of reliable season-long gain-per-acre information, but it appears that 1500 lb of beef per acre in 150 days is reasonable. Average daily gains increased with increasing frame score. No trends with respect to condition score were apparent.

Purchase and sale price of animals, interest expense on borrowed money, pasture and livestock productivity, and cost of producing pasture are the most important determinants of profit or loss in an alfalfa grazing program.

Trial II.

Seventy-two Hereford steers having a similar background and averaging 302 kg were used to determine the effects of monensin and poloxalene, alone and in combination, on feedlot bloat and animal performance. The cattle were allotted to four treatments with three replications each; 300 mg monensin per head per day, 17 g poloxalene per head per day, and 300 mg and 17 g respectively of monensin and poloxalene per head per day.

In experiment 1, the steers were gradually (over 21 days) placed on a 12.1% crude protein ration of (dry matter basis) rolled corn (88%), dehydrated alfalfa (5%), sudangrass silage (2%), and a protein-mineral-drug carrier supplement (5%). It was fed to appetite. Experiment 1 was terminated on day 112 due to the low incidence and degree of bloat which occurred.

Experiment 2 was then initiated using the same animals and the same treatments as used in experiment 1. Cattle were gradually (over 7 days) placed on a bloat-provoking, 19.6% crude protein ration of (dry matter basis) 59% rolled corn, 21% dehydrated alfalfa, and 15% soybean meal along with the protein-mineral-drug carrier supplement used in experiment 1. This ration was also fed to appetite.

Feed intake and animal performance were below normal in all treatments in both experiments. In experiment 1, the control and monensin groups gained at a faster rate ($P<.05$) than the monensin-poloxalene group, but not different from the poloxalene group ($P>.05$). In experiment 2, the monensin-poloxalene group gained at a faster rate ($P<.10$) than the monensin or poloxalene groups, but not different from the control group ($P>.10$). Apparently, the high level of concentrate in the ration deleteriously affected feed intake and, consequently, animal performance.

No significant differences were found in the number of steers bloating among treatments. The degree of bloat observed was not severe enough to affect animal performance, because when comparing individual animals, bloaters performed as well as nonbloaters.