



February 2004

Ag/2004/Beef-02

The Effect on Digestibility and Production of Protein and Energy Supplementation of Stocker Cattle on Intensively-Managed Grass Flood-Meadow Pastures

D.R. ZoBell, K.C. Olson, R.D. Wiedmeier and C. Stonecipher

Department of Animal, Dairy and Veterinary Sciences



Background

In Utah retained ownership of calves beyond weaning is very low (USDA). This may be due to factors such as cash flow but also increased financial risk and the potential for negative or low value-added opportunities. Pastures could provide for increased value-added and retained ownership opportunities through stocker cattle (yearlings on grass) on irrigated and intensively-managed pastures.

Flood meadows are predominant in many of the valleys and normally constitute grasses and sedges with moderate energy levels and relatively low protein values. These pastures are typically allowed to grow to mid-season and then hayed and stock-piled for winter cow feed supplies. Grazing of flood meadow pastures by growing cattle is carried out but production is limited due to nutrient constraints (primarily protein) to maximize growth resulting in marginally competitive costs of gain. Intensive management (use of electric fence and grazing pressure) is now common among stocker operations utilizing tame grass pastures. This provides the opportunity to incorporate supplemental feeding strategies with a higher degree of control than was formerly possible

when cattle were extensively grazed. Limiting nutrients, such as protein, could then be provided which could allow increased production (ZoBell et al., 1993; Karlowsky et al., 1992).

High protein products generally increase weight gains of cattle grazing moderate to low quality forage by increasing forage intake and digestibility (Lusby, 1982). High bypass protein feeds such as corn gluten feed have been successfully used as a protein and energy supplement for growing beef cattle grazing forage in the summer (DeHaan, 1983; Fleck et al., 1986). These high bypass products are particularly valuable where the forage is rapidly degraded such as lush grass or irrigated pastures. The study by Fleck however demonstrated that in late summer there is also increased production when corn gluten feed was supplemented.

Soy Best, an extruded soybean product, has 42 percent protein and 86 percent TDN with 60 percent of the protein as bypass or Undegraded Intake Protein (UIP). By-pass is a term which implies that the protein within the feed is not degraded in the rumen but escapes this environment and is available for absorption in the small intestine. This can be advantageous, particularly if the protein in the feed is already of high quality.

There is little information on the use of soymeal-type products in cattle diets other than use in dairy rations. As a potential supplement for grass pastures it has merit due to high protein and energy values which are limiting on these types of pastures. The proposed research trial will provide valuable information and may assist stocker operations to increase beef production in Utah and in areas of similar circumstance such as the Intermountain west.

The objectives of this study were to determine the effect of supplementation on yearling stocker cattle production and digestibility grazed on flood meadow pastures in northern Utah.

Materials and Methods

In mid-June 15 48 yearling cross bred yearling heifers (approx. 880 lbs) were allocated to one of two treatments. Treatments consisted of a control pastures (CP) where no supplemental feed was provided or supplemented pastures (SP). The supplemented pasture heifers received a daily supplement of a high bypass protein (Soy Best) fed at a rate of 1.10 lbs per day in a trough mixed with ground corn at 2.00 lbs per head per day.

All heifers at processing were treated the same for vaccinations and parasite control. Heifers were weighed every twenty-eight days to determine average daily gain until trial termination (mid-September). Animal health was monitored daily.

Pastures were flood meadows containing predominantly native grasses. Prior to turnout pastures were irrigated and then three more times over the grazing period. Pastures were clipped monthly and analyzed for nutrient levels.

Digestibility Study

To more clearly define the effects of supplementation on rumen function and feed digestibility, four cannulated steers were used in a digestibility trial.

This was a nutrient utilization-ruminal fermentation trial with diets of flood meadow pasture, either supplemented or not with Soy Best and corn. Two of the cannulated steers were on pasture that received supplement and two not. A standard protocol for the purpose of ascertaining digestibility was followed which included the collection of feces and digesta at predetermined times. Chromium boluses were also used which released chromium slowly at a set rate over time and this was used to determine digestibility and passage rate. There was a three week adaptation period followed by a six day collection period. At the end of the first collection period the steers were switched as to their diets in that those that had previously received no supplement were now supplemented and vice versa and the adaptation and collection was repeated. Rumen and fecal samples from both collection periods were frozen and later analyzed for dry matter digestibility.

Results

Results showing the effect of supplementation on average daily gain are shown in Table 1. It is obvious that supplementation increased ADG over the 104 day trial. This result, however, may have been due to a combination of supplemental energy and protein, rather than energy or protein by themselves. Digestibility was also improved with supplementation. Further studies are necessary to determine the effect of supplemental protein without a

carrier. Results are encouraging and suggest that supplementation of irrigated pastures can positively affect productivity of replacement heifers.

Table 1. The effect of supplementation on weight and average daily gain on yearling heifers grazing irrigated flood meadow pastures.

Variable	Control	Treated	Overall Mean
Initial Wt. (lbs)	882	871	880
28 d Wt. (lbs)	920	909	914
ADG 1	1.36	1.32	1.34
56 d Wt. (lbs)	926	918	922
ADG 2	.22	.48	.22
104 d Wt. (lbs)	959	968	963
ADG 3	.66	.99	.84
Overall ADG	.75	.92	

References

- DeHaan, K. 1983. Corn gluten feed-energy source for ruminants. Nebraska Beef Cattle Report MP-44:19.
- Fleck, A.T., K.S. Lusby, and F.T. McCollum. 1986. Corn gluten feed or soybean meal as summer supplements for growing beef cattle grazing native range. Okla. Anim. Sci. Res. Rep. Ag Exp. Sta. OSU. MP-118.
- Karlowsky, J., L.A. Goonewardene, D.R. ZoBell, and D. Westerlund. 1992. Feeding protein supplement to growing heifers on pasture. Proc. 42nd Conf., Can. Soc. Anim. Sci., Calgary, AB.
- Lusby, K.S. 1982. Energy vs protein supplementation of steers grazing native range in late summer and early fall. Okla. Agr. Exp. Sta. Res. Rep. MP-112:36.
- USDA Info Sheet, Animal and Plant health Inspection Service, May 1998.
- ZoBell, D.R., L.A. Goonewardene, and J. Karlowsky. 1993. The effects of feeding a canola/soybean creep to suckling calves on pasture. Proc. World Conf. On anim. Prod., Edmonton, AB, Vol. 2:141-142.

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions.

Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person other wise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities.

This publication is issued in furtherance of Cooperative Extension work. Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jack M. Payne, Vice President and Director, Cooperative Extension Service, Utah State University.