

Enhancing Sustainable Beef Cattle Production on Reclaimed Surface Mined Land
Annual Report 2006-2007

Principal Investigator:
John Hall, Dept. of Animal & Poultry Sciences

Co-Investigators:
W. D. Whittier, VA-MD Regional College of Veterinary Medicine, Dept. of Large Animal
Clinical Sciences
Ozzie Abaye, Department of Crop, Soil, and Environmental Sciences

Introduction

Reclaimed surface mined land offers a variety of alternative uses including forestry, wildlife management, recreation, and beef cattle production. Beef cattle production offers the opportunity to realize annual income from the reclaimed resource rather than delaying income as in the harvest of forest products. In addition, if mining operations are resumed in the reclaimed area, then cattle operations suffer less disruption and loss of income than forestry operations, especially when trees have not reached a marketable size. However, overall returns per acre are lower in beef cattle operations compared to forest products.

The PRP Beef Demonstration Project has showcased the opportunities for beef production on reclaimed mine land. Continued viability of beef operations in coal producing regions of the eastern US will depend on cost efficient production and ability to market a value-added product. In addition, enhancement of the grazing resource and control of undesirable plant species in pastures are critical to decreasing cost of production and increasing productivity of beef operations in coal producing regions.

Three major challenges currently exist to beef production in reclaimed areas. First, traditional pasture management is difficult as practices such as clipping, fertilizing, and weed control are nearly impossible in the rough terrain of reclaimed land. Second, access to quality genetics and use of crossbreeding for herd improvement is limited by geographic location and small herd size. Third, adding value to feeder cattle requires adoption of herd health and marketing practices not usually associated with beef production in coal producing regions.

The focus of the PRP Beef Demonstration Project is to provide research information, demonstration and education on bio-based pasture management, artificial insemination, use of crossbred bulls, and health and marketing programs.

Objectives for 2006-2007

Objectives of the PRP beef project are:

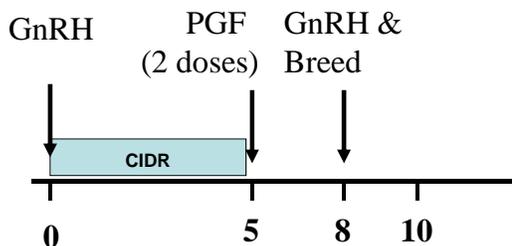
- 1) To compare the effects of a two-breed rotational breeding system vs. using crossbred bulls on calf growth and value as well as cow size and productivity.
- 2) To demonstrate total timed-AI systems for beef cows and heifers
- 3) To examine mineral profiles and possible mineral antagonisms among fertilizer source, grazing forage, and water supply.
- 4) To demonstrate the impact of goats on woody invaders.
- 5) To enhance water and grazing distribution on reclaimed land.
- 6) To benefit the coal industry and region by showing that reclaimed land can make an important contribution to the economic life of the community

Methods

Forage was stockpiled for winter grazing by applying 50 units of N per acre to approximately 1/3 of the acreage in August 2006. Forage samples were taken in August and October 2006. Calves born in 2006 were marketed in November 2006 along with calves from the Coalfields Cattlemen's Association.

In 2006, cows were artificially inseminated (AI) to Angus or Simangus (Angus X Simmental) sires. All cows were exposed to an Angus bull that bred any cows not conceiving to AI. Cows calved in March and April 2007. In May 2007, all cows were estrous synchronized using the CO-Synch 5-d CIDR system (Figure 1.) All cows were

Figure 1. CO-SYNCH 5d-CIDR System



inseminated on a single day with no estrus detection. Cows were vaccinated against IBR, PI3, BVD and BRSV pre-breeding. Calves were vaccinated against IBR, PI3, BVD, BRSV, and heamophilus somnus as well as clostridial diseases. All calves and young cows (< 3 years-old) were dewormed in June. All male calves were castrated and implanted twice with Ralgro®. Calves were weighed in May and July.

During the summer of 2006, engineers from Penn-Virginia Coal marked the ideal location for a new well for the pasture system. A new generator was purchased to supply power to the well pump(s) since mains power was no longer available. In fall 2006, a permit to drill a well to improve the water system was applied for with the local health department

Results:

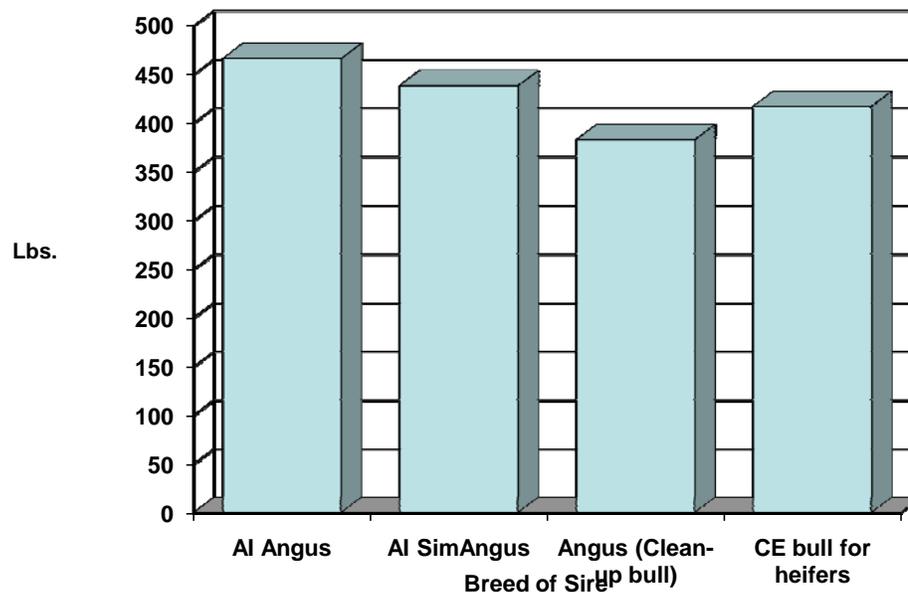
Forage Production

Stockpiling of fescue for winter grazing and rotational grazing management provided sufficient grazing for over 10 months of the year. The forage/grazing program resulted in cows in an average body condition of 5.6 (1=emaciated to 5 = optimum to 9 = obese) at the beginning of the breeding season. Only approximately 1500-2000 lbs of hay per cow was required to winter the cow herd. Thus, the grazing season can be effectively extended in pasture developed on reclaimed land resulting in decreased production costs.

Cow and Calf Performance

Thirty-six cows and eight replacement heifers calved in March and April of 2007. Fifty-six percent of the calves were sired by AI sires. Growth as determined by weight in late July age is illustrated in Figure 2. SimAngus calves produced by AI were heavier than calves from Angus AI bulls. In addition, AI calves out gained calves from clean-p and calving ease Angus sires. This is the second year of data which indicates that crossbred bulls can be used in place of terminal type continental bull breeds without sacrificing calf performance.

Figure 2. Effect of Sire on Growth Rate of Calves
(Weight on 7/24/07)



Responses to estrous synchronization and artificial insemination were excellent for the second year. Over 59% of the cows became pregnant to fixed-time insemination. These data agree with other studies we conducted which indicate that small beef herds can be bred by AI in a single day

with excellent pregnancy rates. Pregnancy rates above 50% to AI are considered good and pregnancy rates exceeding 60% are excellent.

Water system development

Water system development was stymied by the inability to obtain approval for the well. Relocation of the well may be required or clarification of the location of the well and its use may be needed.

Reduction of woody invading species with goats.

This project was expanded in 2006-2007 and a separate project was created. Results of this project will appear under a separate report.

Pasture mineral content and animal mineral status

Initial forage samples indicated forage on the site was deficient in Ca, P, Mg, Cu, Se, Mn, and Zn relative to mineral requirements for beef cattle. This is normal for most soils in Virginia and the region. However, pastures growing on biosolid amended soils had a 4 fold higher level of Mo. High concentrations of molybdenum can inhibit uptake of copper level in cattle. The levels contained in the pasture forage should not create Cu deficiencies in cattle. However, elevated Mo levels in forage combined with high S levels in forage or water can create Cu deficiencies. Further research will investigate S content of well water on the project as well as liver Cu content in cattle.