

NR 27. STRATEGIC NUTRITIONAL MANAGEMENT TECHNOLOGIES FOR ENHANCING FORAGE BEEF PRODUCTION IN THE TROPICAL VENEZUELAN LLANOS

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Resumen

Tecnologías estratégicas de manejo nutricional para aumentar la producción de forrajes para ganado de carne en los llanos venezolanos tropicales

Se investigaron tecnologías claves de manejo nutricional en toros y novillos. Las estrategias nutricionales incluyeron 1) un suplemento mineral (MIN) o 2) un suplemento estratégico (STRAT) que incluye minerales claves, una proteína de degradación lenta para proporcionar una continua liberación de nitrógeno, ionóforo, fibra degradable, y grasa encapsulada. Se alimentó intensivamente al ganado en pasturas irrigadas hasta que se alcanzara el peso (promedio 495 kg) y la condición deseada. Se implantó inicialmente el ganado con zeranol (72 mg) o Revalor seguido por un segundo implante de zeranol (72 mg). Los días para el beneficio promediaron 235 y 196 d para los suplementos MIN y STRAT, respectivamente. La ganancia de peso diaria acumulada hasta el día 182 promedió 676 y 818 g/d para MIN y STRAT, respectivamente, para un incremento de 140 g/d y 25.8 kg de peso adicional. Ajustada al rendimiento en canal del testigo, la respuesta para el día 182 fue una ganancia de peso de 32.6 kg o una ganancia diaria adicional de 179 g con el suplemento STRAT. El consumo del suplemento promedió 84 y 945 g/d para MIN y STRAT, respectivamente, para una conversión de 5.25 g de ganancia adicional /g de suplemento STRAT vs. MIN en un tiempo similar en pasturas. La estrategia del uso del suplemento STRAT aceleró el crecimiento del ganado quedando listo para la venta antes del comienzo de la estación lluviosa a precios competitivos en el mercado.

Palabras claves: Estrategia nutricional, proteína, minerales, forrajes.

Key words: Nutritional strategy, protein, minerals, forages.

Introduction

Cattle in most regions of the world where feed grains are not readily available at economically attractive prices, must grow and produce beef for marketing strictly from forage energy, usually in the form of warm season perennials (Bagley, 1996). Much of these are present in the form of complex structural carbohydrates reflecting the high heat units and short day lengths of tropical climate ecosystem growing conditions. Further, these plant species also are commonly low to very low in protein supply, which becomes rate limiting for cellulolytic microbes, restricting both rate and extent of energy extraction from cellulose, and diverting hydrogen and energy flow from usable endproducts to methane and heat. In contrast, male cattle in the stocker through finishing phase of growth in these systems produce very lean carcasses (Rivera, 1994) with little fat and as a consequence have very high absorbable amino acid needs to meet circulating protein requirements to supply substrates for muscle growth. Successful production of carcass beef under 30 months of age will require strategic nutrient provisioning and technology to turbocharge and synergize the microbial system to more rapidly and completely hydrolyse rather than simply replace plant structural carbohydrates and to then convert the extracted energy to useful substrates for the host animal. Several technologies are available to accomplish this objective. Continuous release designed protein delivery, ionophores to divert hydrogen, readily fermentable fiber and encapsulated lipids offer technologies to meet these goals (Byers, 1995, 1996, 1997). The key is to develop strategies to deliver these technologies in ways that will enhance fermentative rate and efficiency to allow greater intake and animal productivity. Experiments were designed to address this issue.

Materials and methods

Brahman and *Bos taurus*-Brahman crosses averaging 338 kg and 2 years of age were used in an experiment to assess nutritional management technologies for cattle being finished to market weight on tropical forages on a ranch with water regulation (capture and irrigation as in rice culture) in the periodically flooded low llanos in

the Apure state of Venezuela. The ranch is located 7° 54' North of the equator and 43 m above sea level. Annual precipitation (~May to October) ranges from 1000-1800 mm with temperature of 22 to 29 °C, with a dry season from November to April (Avellaneda, 1993, Rodríguez, 1986). The response in growth and carcass quality of 102 intact and 20 castrate males grazing dry season followed by irrigated dry season native (Lambedora) improved (Tanner grass) forages (Rodríguez and Betancourt, 1991, Rodríguez, 1996) to selected strategic technologies was investigated. Forages were collected monthly for analyses (figure 1). Nutritional strategies included 1) a macro/tracemineral supplement (MIN) or 2) a strategic (STRAT) supplement including key minerals, a slowly degrading protein source (feather meal) to provide a continuous nitrogen release, ionophore (Salocin), degradable fiber (rice polishings), and capsulized fat (whole cottonseed). Cattle initially were intensively grazed on flood and pump irrigated pastures until target weight (average 495 kg) and condition were achieved. Cattle were implanted initially with zeranol (72 mg) or Revalor followed by a second implant of zeranol (72 mg). Mineral supplement for MIN cattle was provided continuously and STRAT (comprised of feather meal, whole cottonseed, molasses, rice polishings, mineral mix and Salocin at 10, 0, 5, 77.9, 7, and 1 % for d 0-60 and 10, 49.9, 5, 28, 7, and 1 % for d 61-182), was hand-fed at 1 kg/hd daily. All steers were assigned to STRAT with bulls assigned to MIN or STRAT. Cattle were rotated between pastures and through the season all cattle were rotated through the same pasture sequences to avoid pasture differences. All cattle were individually weighed initially and at ~30 d intervals through day 182, when the first group of animals were selected as ready for slaughter. Cattle were marketed in groups as they reached slaughter weight and condition.

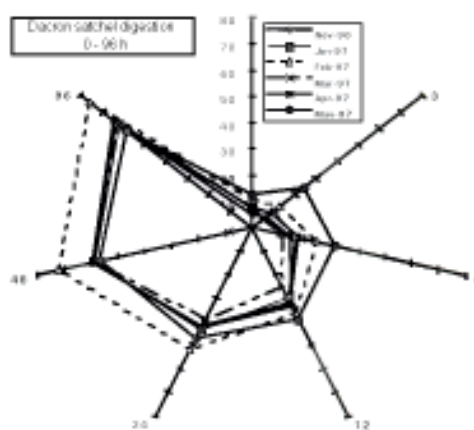


Figure 1. Rate and extent of in situ dry matter digestibility of forages grazed vs. month.

Results and discussion

Weight and growth responses at 30 d intervals through 182 d, and weight and days at termination were collected for each animal. As is evident (figure 2), supplemented steers and bulls grew similarly for the majority of the experimental period, with a reduction in later stages. Bulls responded to the STRAT supplement in the first period, and this increment in daily gain was maintained through 150 d, after which the response was attenuated relative to MIN. Total MIN or STRAT consumption was 15.3 vs. 172 kg/hd or 84 vs. 945 g/d through d 182. At 182 d, the first group was selected for slaughter and supplementation with STRAT was ceased. At this point, the MIN and STRAT cattle averaged 459.4 and 487.2 kg and differed ($P < .001$) in weight. Average daily gain to 182 d averaged 676 vs. 818 g ($P < .001$), for a 142 g/d response. Further, the STRAT supplement enhanced ($P < .001$) dressing percentage from 57.6 to 59.0 % at termination, and adjustment of d 182 response to a common dressing percentage yielded a 32.6 kg response in weight or 179 g response in daily gain. Conversion of STRAT supplement to weight gain above MIN was 5.25/1 at 182 d. Days to slaughter for all cattle to reach the target weight averaged 235 vs. 196 d respectively for MIN vs. STRAT supplements. Adjusted final weights averaged 494.7 vs. 502.5 kg for MIN vs. STRAT respectively. Accumulative gain to slaughter averaged 668 vs. 830 g/d, for a 162 response with STRAT. The 878 g STRAT supplemented yielded a 162 g response in additional daily gain for a 5.4/1 conversion. The STRAT supplementation strategy accelerated growth to allow finishing cattle prior to beginning of the rainy season and marketing at a price advantage, while producing a 2/1 financial return on supplement (45 Bs/d) as added beef (90 Bs/d) produced.

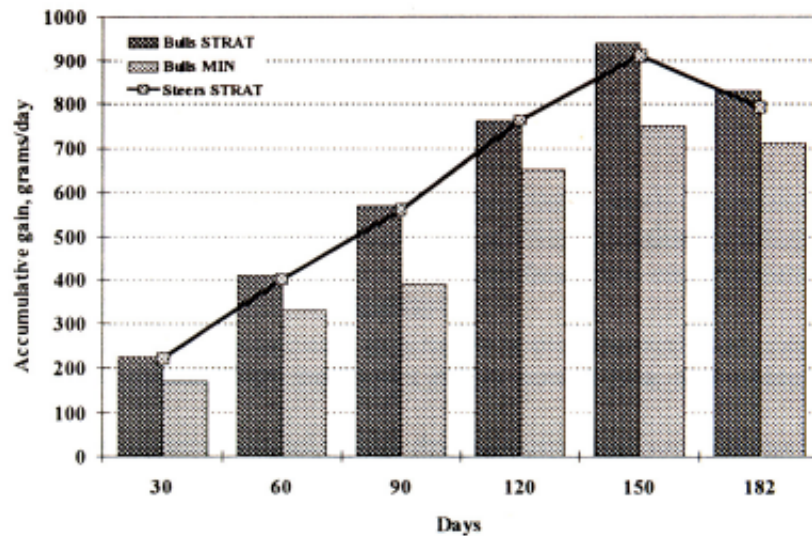


Figure 2. Accumulative daily gain vs. days on experiment for cattle finishing on intensive pastures with strategic nutritional management technologies.

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