

# Performance and carcass attributes of feedlot steers supplemented with parenteral trace minerals and vitamins

Mattioli Guillermo A.

Faculty of Veterinary Science,  
Universidad Nacional de La Plata,  
Argentina

contact author:  
mattioli@fcv.unlp.edu.ar

Raggio Santiago J.

Biogénesis Bagó S.A. Garín, Argentina

Garriz Rodrigo

Biogénesis Bagó S.A. Garín, Argentina

Galarza Esteban

Faculty of Veterinary Science,  
Universidad Nacional de La Plata,  
Argentina

Apa Fernando

Faculty of Veterinary Science,  
Universidad Nacional de Rosario,  
Argentina

## Objectives

Beef cattle fattening system, especially during receiving period, generates strong oxidative stress, affecting weight gain and carcass attributes.

The objective of this study was to evaluate the effect of parenteral supplementation with minerals and vitamins that intervene in antioxidant defense during admission to a feedlot system on these parameters.

## Materials and Methods

The study was carried out in a commercial feedlot (CONECAR, Ganadería Santa Fe SA) located in Carcarañá, Santa Fe province, Argentina. Fifty-six Aberdeen Angus steers were used, with an average body weight (BW) of  $321.1 \pm 12.9$  kg, which arrived at feedlot after a 750 km trip. At arrival (Day 0) the animals were randomly divided into two groups. The treated group (TG, n=27) received on Day 0 a subcutaneous injection with trace minerals (copper 40 mg, zinc 160 mg, manganese 40 mg and selenium 20 mg; ADAPTADOR MIN, Biogénesis Bagó, Argentina) and another with vitamins (vitamin A palmitate 238,000 IU and vitamin E acetate 200 IU; ADAPTADOR VIT, Biogénesis Bagó, Argentina), while the control group (CG, n=29) did not receive any treatment. The animals were weighed on Days 0, 17, 43, 55, 113 and 192 (the last weighing was done 3 days prior to slaughter). On Days 55 and 113, ultrasound scans of the carcass were performed to assess the ribeye area, backfat thickness, and percentage of intramuscular fat, while retail cut, yield grade, and marbling score were also assessed on day 113. On the day of slaughter, the carcass evaluation was carried out in the slaughterhouse to determine Yield and weight of the carcass. (Figure 1)

Figure 1 : Activities upon animal's arrival to feedlot,



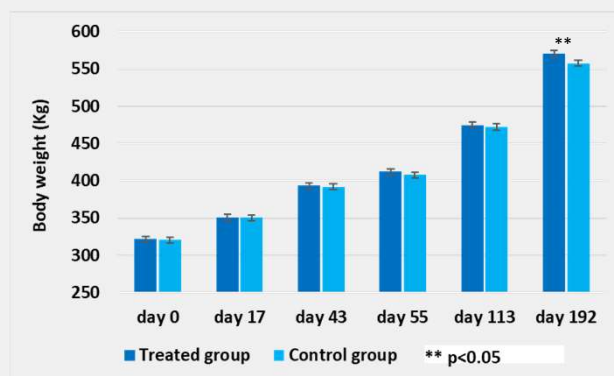
To evaluate BW, average daily gain (ADG), ribeye area, backfat thickness, and percentage of intramuscular fat, mixed linear regression models with repeated measures over time were used (PROC MIXED of SAS 9.4; SAS Institute Inc). Time (Days), Treatment (TG and CG) and their interaction were used as fixed effects, and the animal as random effect. Slice statement was used for detecting differences within each interaction.

The retail cut, yield grade, marbling score, yield and carcass weight were analyzed with linear regression models with PROC MIXED, using Treatment as the only fixed effect. Data is presented as least squares means  $\pm$  standard error of the mean. Values of  $p \leq 0.05$  are considered significant and  $p < 0.1$  and  $> 0.05$  are considered tendencies.

## Results

With regard BW, there was a Time effect ( $p < 0.01$ ) and a Time x Treatment interaction tendency ( $p = 0.07$ ), because on Day 192 the TG had greater BW than the CG ( $570.8 \pm 4.7$  vs  $557.7 \pm 4.5$  kg, respectively;  $p = 0.04$ ). There were no differences for BW between the groups on the rest of the Days ( $p > 0.05$ ) (Figure 2).

Figure 2: Body weight variation in steers supplemented with vitamins and minerals (treated group) and non-supplemented animals (control group).



Regarding ADG, only a Time effect was observed ( $p < 0.01$ ), although in the period between Days 43 and 55 the TG tended to gain more weight than the CG ( $1.589$  vs  $1.302$  kg/day, respectively;  $p = 0.09$ ). Regarding the ribeye area, backfat thickness and percentage of intramuscular fat, only a Time effect ( $p < 0.01$ ) was observed. There was no Treatment effect ( $p > 0.1$ ) on Retail Cut ( $64.7 \pm 0.2$  vs  $64.8 \pm 0.2\%$ ), Yield Grade ( $2.54 \pm 0.04$  vs  $2.56 \pm 0.04$ ), Marbling score ( $4.34 \pm 0.03$  vs  $4.32 \pm 0.03$ ), Yield ( $59.9 \pm 0.3$  vs  $60.2 \pm 0.3\%$ ) and carcass weight ( $342 \pm 3.5$  vs  $335.7 \pm 3.4$  kg; TG and CG, respectively).

## Conclusions

It is concluded that under the conditions of this study, parenteral supplementation with minerals and vitamins that intervene in the antioxidant defense at the entrance of a fattening pen increased the weight of the animals at the end of the cycle, without modifying the carcass.

## **Desempeño y atributos de carcasa de novillos en engorde a corral suplementados vía parenteral con vitaminas y minerales**

El sistema de engorde de bovinos a corral, especialmente durante la recepción, genera un fuerte estrés oxidativo en los animales, el cual pueden condicionar el aumento de peso y los atributos de la carcasa. El objetivo del presente estudio fue evaluar el efecto de la suplementación parenteral con minerales y vitaminas que intervienen en la defensa antioxidante durante el ingreso a un sistema de engorde a corral sobre estos parámetros. El estudio se llevó a cabo en un feedlot comercial (CONECAR, Ganadera Santa Fé SA) ubicado en Carcarañá, provincia de Santa Fé, Argentina. Se utilizaron 56 novillos de raza Aberdeen Angus, con un peso promedio de  $321,1 \pm 12,9$  kg, que arribaron al establecimiento luego de un viaje de 750 km. Al quinto día del arribo al establecimiento (Día 0) los animales fueron divididos aleatoriamente en dos grupos. El grupo tratado (GT, n=27) recibió el Día 0 una inyección subcutánea con minerales (cobre 40 mg, zinc 160 mg, 40 mg manganeso y 20 mg selenio; ADAPTADOR MIN, Biogénesis Bagó, Argentina) y otra con vitaminas (vitamina A palmitato 238000 UI y vitamina E acetato 200 UI; ADAPTADOR VIT, Biogénesis Bagó, Argentina), mientras que el grupo control (GC, n=29) no recibió tratamiento alguno. Los animales fueron pesados los Días 0, 17, 43, 55, 113 y 192 (el último pesaje se realizó 3 días previo a la faena). En los Días 55 y 113 se realizaron ecografías de carcasa para evaluar área de ojo de bife, espesor de grasa dorsal, porcentaje de grasa intramuscular, mientras que el retail cut, yield grade y marmoreo se evaluó al día 113. El día de la faena se realizó la evaluación de la canal en el frigorífico para determinar Rinde y peso de la canal. Para evaluar el peso, la ganancia diaria de peso (GDP), el área de ojo de bife, espesor de grasa dorsal y grasa intramuscular se utilizaron modelos de regresión lineal mixtos con medidas repetidas en el tiempo (PROC MIXED de SAS 9.4; SAS Institute Inc). Se utilizó al Tiempo (Días), al Tratamiento (GT y GC) y la interacción entre ambos como efectos fijos, y al animal como efecto aleatorio. En caso de existir interacción se utilizó el SLICE statement para determinar en qué momento del tiempo se produjo la misma. El retail cut, yield grade, marmoreo, peso y rinde de la canal se analizaron con modelos de regresiones lineales con PROC MIXED, usando al Tratamiento como único efecto fijo. Los datos se presentan como medias de los mínimos cuadrados  $\pm$  error estándar de la media. Se consideran significativos valores de  $p \leq 0,05$  y tendencias a  $p < 0,1$  y  $p > 0,05$ . En el peso se observó un efecto del Tiempo ( $p < 0,01$ ) y una tendencia en la interacción Tiempo x Tratamiento ( $p = 0,07$ ), debido a que en el Día 192 el GT tuvo mayor peso que el GC ( $570,8 \pm 4,7$  vs  $557,7 \pm 4,5$  kg, respectivamente;  $p = 0,04$ ), sin observarse diferencias entre los grupos en el resto de los Días ( $p > 0,05$ ). En cuanto a GDP solo se observó un efecto significativo del Tiempo ( $p < 0,01$ ), aunque en el período comprendido entre los Días 43 y 55 el GT tendió a ganar más peso que el GC ( $1,589$  vs  $1,302$  kg/día, respectivamente;  $p = 0,09$ ). En cuanto al área de ojo de bife, espesor de grasa dorsal y grasa intramuscular, se observó un efecto del Tiempo ( $p < 0,01$ ) pero no del Tratamiento ni de la interacción ( $p > 0,1$ ). No se observó efecto del Tratamiento ( $p > 0,1$ ) sobre Retail Cut, Yield Grade, Marbling, Rinde y peso de la canal ( $64,7 \pm 0,2$  vs  $64,8 \pm 0,2\%$ ;  $2,54 \pm 0,04$  vs  $2,56 \pm 0,04$ ;  $4,34 \pm 0,03$  vs  $4,32 \pm 0,03$ ;  $59,9 \pm 0,3$  vs  $60,2 \pm 0,3\%$ ;  $342 \pm 3,5$  vs  $335,7 \pm 3,4$  kg; GT vs GC, respectivamente). Se concluye que bajo las condiciones de este estudio la suplementación parenteral con minerales y vitaminas que intervienen en la defensa antioxidante al ingreso de un engorde a corral aumentó el peso de los animales al final del ciclo, sin modificar la carcasa.





mL hematocrit;  $p < 0.01$ ).

**Conclusions:** The results indicate that parenteral Cu (0.3 mg/kg), Zn (1 mg/kg) and Se (0.2 mg/kg) supplementation on pre-weaning beef calves increase BW and improve Cu and Se status.

**Keywords:** calves, copper, zinc, selenium, supplementation.

#### AH-P39

##### Performance and carcass attributes of feedlot steers supplemented with parenteral trace minerals and vitamins

Santiago Raggio<sup>1</sup>, Fernando Apa<sup>2</sup>, Rodrigo Garriz<sup>1</sup>, Esteban Galarza<sup>3</sup>, Guillermo Mattioli<sup>3</sup>.

<sup>1</sup>Biogénesis Bagó SA, Garín, Argentina; <sup>2</sup>Fac. Cs Veterinarias (Univ. Nac. Rosario), Rosario, Argentina; <sup>3</sup>Facultad de Veterinaria (Univ. Nac. La Plata), La Plata, Argentina.

**Objectives:** Beef cattle fattening system, especially during receiving period, generates strong oxidative stress, affecting weight gain and carcass attributes. The objective of this study was to evaluate the effect of parenteral supplementation with minerals and vitamins that intervene in antioxidant defense during admission to a feedlot system on these parameters.

**Materials and methods:** The study was carried out in a commercial feedlot (CONECAR, Ganadera Santa Fé SA) located in Carcarañá, Santa Fé province, Argentina. Fifty-six Aberdeen Angus steers were used, with an average body weight (BW) of  $321.1 \pm 12.9$  kg, which arrived at feedlot after a 750 km trip. At arrival (Day 0) the animals were randomly divided into two groups. The treated group (TG,  $n=27$ ) received on Day 0 a subcutaneous injection with trace minerals (copper 40 mg, zinc 160 mg, manganese 40 mg and selenium 20 mg; ADAPTADOR MIN, Biogenesis Bagó, Argentina) and another with vitamins (vitamin A palmitate 238,000 IU and vitamin E acetate 200 IU; ADAPTADOR VIT, Biogenesis Bagó, Argentina), while the control group (CG,  $n=29$ ) did not receive any treatment. The animals were weighed on Days 0, 17, 43, 55, 113 and 192 (the last weighing was done 3 days prior to slaughter). On Days 55 and 113, ultrasound scans of the carcass were performed to assess the ribeye area, backfat thickness, and percentage of intramuscular fat, while retail cut, yield grade, and marbling score were also assessed on day 113. On the day of slaughter, the carcass evaluation was carried out in the slaughterhouse to determine Yield and weight of the carcass. To evaluate BW, average daily gain (ADG), ribeye area, backfat thickness, and percentage of intramuscular fat, mixed linear regression models with repeated measures over time were used (PROC MIXED of SAS 9.4; SAS Institute Inc). Time (Days), Treatment (TG and CG) and their interaction were used as fixed effects, and the animal as random effect. Slice statement was used for detecting differences within each interaction. The retail cut, yield grade, marbling score, yield and carcass weight were analyzed with linear regression models with PROC MIXED, using Treatment as the only fixed effect. Data are presented

as least squares means  $\pm$  standard error of the mean. Values of  $p \leq 0.05$  are considered significant and  $p < 0.1$  and  $> 0.05$  are considered tendencies.

**Results:** With regard BW, there were a Time effect ( $p < 0.01$ ) and a Time  $\times$  Treatment interaction tendency ( $p = 0.07$ ), because on Day 192 the TG had greater BW than the CG ( $570.8 \pm 4.7$  vs  $557.7 \pm 4.5$  kg, respectively;  $p = 0.04$ ). There were no differences for BW between the groups on the rest of the Days ( $p > 0.05$ ). Regarding ADG, only a Time effect was observed ( $p < 0.01$ ), although in the period between Days 43 and 55 the TG tended to gain more weight than the CG ( $1,589$  vs  $1,302$  kg/day, respectively;  $p = 0.09$ ). Regarding the ribeye area, backfat thickness and percentage of intramuscular fat, only a Time effect ( $p < 0.01$ ) was observed. There was no Treatment effect ( $p > 0.1$ ) on Retail Cut ( $64.7 \pm 0.2$  vs  $64.8 \pm 0.2\%$ ), Yield Grade ( $2.54 \pm 0.04$  vs  $2.56 \pm 0.04$ ), Marbling score ( $4.34 \pm 0.03$  vs  $4.32 \pm 0.03$ ) Yield ( $59.9 \pm 0.3$  vs  $60.2 \pm 0.3\%$ ) and carcass weight ( $342 \pm 3.5$  vs  $335.7 \pm 3.4$  kg; TG and CG, respectively).

**Conclusions:** It is concluded that under the conditions of this study, parenteral supplementation with minerals and vitamins that intervene in the antioxidant defense at the entrance of a fattening pen increased the weight of the animals at the end of the cycle, without modifying the carcass.

**Keywords:** Feedlot, body weight, carcass attributes, trace minerals, vitamins.

#### AH-P40

##### A longitudinal study of bovine trichomonosis incidence in Spanish beef mountain herds with different infection status

Nerea Pena-Fernández<sup>1</sup>, Javier Moreno-Gonzalo<sup>2</sup>, Luis Miguel Ortega-Mora<sup>3</sup>, Esther Collantes-Fernández<sup>3</sup>.

<sup>1</sup>SERIDA, Asturias, Spain; <sup>2</sup>SALUVET, Animal Health Animal Department, Veterinary Faculty, Complutense University of Madrid, Madrid, Spain; <sup>3</sup>SALUVET, Animal Health Animal Department and SALUVET INNOVA, S.L. Veterinary Faculty, Complutense University of Madrid, Madrid, Spain.

**Objectives:** Bovine trichomonosis (BT) is a sexually transmitted disease considered a major cause of early reproductive failure in natural extensive breeding cattle. In the absence of effective vaccines and drugs, BT is controlled by diagnostic testing and culling of infected bulls. In Spain, BT is substantially spread among beef cattle herds and its control is voluntary<sup>1</sup>. We observed that herds from mountain management systems are at greater risk for the introduction of the infection, which could be attributed to the relatively high local prevalence and specific management practices, such as the use of communal grazing lands<sup>1,2,3</sup>. In the present study, a longitudinal study was carried out to compare infection incidence in three epidemiological scenarios: i) herds with BT-negative status (BT-negative herds); ii) herds with BT-positive status where infected bulls were eliminated to interrupt the transmission cycle (BT-cleared herds); and iii) BT-positive herds where positive bulls were maintained in the herd (BT-positive herds).