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The fine line between economic efficiency and animal welfare in feedlots in Uruguay

La delgada línea entre eficiencia económica y bienestar animal en engordes a corral en Uruguay

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ABSTRACT

In Uruguay, the intensification of beef production has driven the growth of feedlot systems as a response to economic pressures and the demands of high-value markets. This article analyzes the tension between the economic efficiency of these systems and animal welfare. Through a literature review, the economic advantages are identified, such as higher profitability and a reduced slaughter age. Simultaneously, critical animal welfare challenges documented in Uruguay are exposed, including the lack of shade, excessive mud in pens, and a high incidence of metabolic disorders like ruminal acidosis, which is the leading cause of mortality. The analysis argues that economic efficiency and animal welfare are not opposing goals but are interdependent. Deficiencies in welfare, such as heat stress or management-related pathologies, negatively impact productivity and lead to direct economic losses. Therefore, the article concludes with a call to action for producers and technicians to consider improvements in infrastructure and management as a strategic investment that not only fulfills an ethical responsibility but also optimizes the sustainability and profitability of the business, thereby strengthening the brand image of Uruguayan beef.

Keywords: feedlot, animal welfare, beef cattle, economic efficiency, acidosis, Uruguay.

RESUMEN

En Uruguay, la intensificación de la producción de carne ha impulsado el crecimiento de los sistemas de engorde a corral (feedlot) como respuesta a presiones económicas y demandas de mercados de alto valor. Este artículo analiza la tensión entre la eficiencia económica de estos sistemas y el bienestar animal. A través de una revisión bibliográfica, se identifican las ventajas económicas, como la mayor rentabilidad y la reducción de la edad de faena. Simultáneamente, se exponen los desafíos críticos para el bienestar animal documentados en Uruguay, que incluye la falta de sombra, el exceso de barro en los corrales y una alta incidencia de desórdenes metabólicos como la acidosis ruminal, que constituye la principal causa de mortalidad. El análisis argumenta que la eficiencia económica y el bienestar animal no son objetivos contrapuestos, sino interdependientes. Las deficiencias en bienestar, como el estrés por calor o las patologías asociadas al manejo, impactan negativamente en la productividad y generan pérdidas económicas directas. Por lo tanto, el artículo concluye con un llamado a la acción para que productores y técnicos consideren las mejoras en infraestructura y manejo como una inversión estratégica que no solo cumple con una responsabilidad ética, sino que también optimiza la sostenibilidad y rentabilidad del negocio, y fortalece la marca país de la carne uruguaya.

Palabras clave: engorde a corral, bienestar animal, bovinos de carne, eficiencia económica, acidosis, Uruguay.

INTRODUCTION

Uruguay has built its global prestige on the image of vast pastures and livestock raised in pastoral systems, a hallmark of naturalness and quality that resonates in the most demanding markets. However, in recent decades, the productive landscape has undergone an undeniable transformation. The expansion of agriculture and forestry has intensified competition for land, driving up its price and displacing livestock farming. In this scenario, and in response to the demand from international markets with specific grain-finishing requirements, the feedlot system has consolidated as a crucial intensification strategy for the competitiveness of the beef sector (Nin-Pratt *et al*., 2019). This production model, which already accounts for more than 14% of the national slaughter, offers clear economic advantages in terms of efficiency, predictability, and access to high-value markets (Frade *et al*., 2025). However, the image of intensive confinement—often associated with muddy pens, a lack of shade, and high stocking densities—creates a visible tension and raises an inescapable question of growing social relevance: where does animal welfare fit into this equation of efficiency? Concern for animal welfare is no longer a marginal issue; it is a factor that influences trade policies, consumer perception, and the very sustainability of the business (Huertas *et al.*, 2014). This article does not seek to condemn the feedlot system, but rather to provide a reflective analysis of the fine line separating economic imperatives from our ethical responsibility toward animals. Through a review of technical literature and documented experiences, this paper explores the role of animal welfare in Uruguayan feedlots, identifying current challenges and presenting a call to action so that productive efficiency and humane treatment not only coexist but mutually reinforce one another.

The Economic Factor: The Inescapable Logic of Confinement

- The decision to implement a feedlot system is a rational response to economic pressures and opportunities. The benefits are measurable, significant, and explain its progressive adoption.
- **Higher Profitability and Production Efficiency.** Comparative studies in Uruguay demonstrate that feedlot-finishing systems can increase the net margin by up to 107% compared to supplemented pastoral systems (Clariget *et al.*, 2024). This is achieved through a higher Average Daily Gain (ADG), which averages 1.28 kg/day in Uruguayan feedlots (Frade *et al*., 2025), and a better feed conversion efficiency (Clariget *et al*., 2024). A higher ADG significantly shortens the production cycle, reduces the age at slaughter, and therefore increases capital turnover and beef production per hectare per year (Clariget *et al*., 2024; Nin-Pratt *et al*., 2019).

- **Access to High-Value Markets.** The consolidation of high-value export quotas, such as "Quota 481," requires animals to be fed a grain-based diet for a minimum period, generally 100 days (Frade *et al*., 2025). The feedlot is the system *par excellence* to meet these requirements, opening doors to markets that offer a price premium for grain-finished beef (Clariget *et al*., 2024).
- **Optimization of Land Use.** In the face of sustained increases in land prices, traditional extensive cattle ranching loses economic viability. The feedlot allows production to be "decoupled" from land area, enabling the production of more kilograms of beef on less acreage and freeing up land for other agricultural or livestock uses (Nin-Pratt *et al*., 2019).
- **Risk Control and Reduction.** Unlike pastoral systems, which are vulnerable to droughts and other harsh weather conditions, confinement offers near-total control over the diet and the production environment (Wagner *et al*., 2014). This reduces variability in outcomes, facilitating planning and the fulfillment of contracts (Wagner *et al*., 2014).

The driver of this efficiency is the high-energy diet, where feed can account for up to 80% of total costs (Arias Díaz & Rucks Montoya, 2012). This nutritional focus is key to understanding both the economic benefits and the intrinsic challenges to animal welfare.

Under the Microscope: Critical Animal Welfare Challenges in the System

The concept of animal welfare is complex and multidimensional. It is not just about avoiding mistreatment, but about ensuring what is known as the "Five Freedoms": freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury, and disease; freedom to express normal behavior; and freedom from fear and distress (Blasco & Mateu, 2011). Intensive confinement, by its very nature, presents challenges in several of these areas.

Infrastructure and Environment: Comfort at Risk

An exhaustive survey of 71 feedlots in Uruguay, along with other evaluations of facilities in the region, reveals concerning deficiencies (Banchero *et al*., 2016):

- **Shade, a Pending Challenge.** The Uruguayan study found that 68% of the facilities do not have shade in the pens (Banchero *et al.*, 2016). This is critical. During summer, heat stress is not just a matter of comfort; it drastically reduces feed intake and weight gain. Providing shade is one of the measures with the greatest positive impact, estimated to improve ADG by 15% and feed conversion efficiency by 7% (Costabel, 2020).

- **Mud, a Silent Enemy.** More than 60% of the pens analyzed in Uruguay have compacted dirt floors (Banchero *et al*., 2016). An increase of up to 33% in energy requirements has been measured due to the additional physical activity required of the animals under waterlogged and rainy environmental conditions, to the detriment of weight gain (Pordomingo, 2003). Mud, moisture, fecal matter accumulation, and soil conditions are predisposing factors for hoof problems and infectious diseases, which are among the main health conditions reported (Confalonieri *et al*., 2016)

- **Vital Space.** The average surface area per animal in Uruguayan pens is 38 m² (Banchero *et al.,* 2016). While this may be adequate under dry conditions, mud drastically reduces the useful resting area and forces the animals to stand for prolonged periods in unsanitary conditions (Confalonieri *et al*., 2016).

Health and Pathologies: The Consequences of Intensification

The transition from a pastoral diet to one with a high grain concentration is the main physiological challenge and the underlying cause of the primary pathologies in the feedlot (Nagaraja & Chengappa, 1998).

Ruminal Acidosis, the Leading Killer. Unlike North American feedlots, where respiratory problems predominate, digestive disorders are the main cause of morbidity and mortality in Uruguay. Acidosis was identified as the most significant clinical problem and is responsible for 44% of the deaths recorded in the pens (Banchero *et al*., 2016). This condition, caused by a sharp drop in rumen pH, damages its walls and can lead to liver abscesses, which are the main cause of liver condemnation at the packing plant (Nagaraja & Chengappa, 1998).

Hoof Problems and Laminitis. Chronic subclinical acidosis is directly related to laminitis, an inflammation of the hooves that causes intense pain and lameness (Nagaraja & Chengappa, 1998). This condition, reported as significant in 27% of the properties (Banchero *et al*., 2016), is not only a source of suffering, but it also limits the animal's ability to move and access the feed bunk and water, prolonging a cycle of low performance. The transition from a pastoral diet to one with a high grain concentration is the main physiological challenge and the underlying cause of the primary pathologies in the feedlot (Nagaraja & Chengappa, 1998).

Table 1. Impact Analysis and Potential Solutions and Improvements

Welfare Issue	Negative Impact on Production and Economy	Possible Solutions / Improvements
Lack of Shade	- Reduction in feed intake and Average Daily Gain (ADG). Access to shade can improve ADG by 15% and feed conversion efficiency by 7%. In Uruguay, a benefit of over 40 USD/head has been estimated with shade, compared to a cost of 5 USD/head (Costabel, 2020).	Investment in artificial shade structures or design of pens with access to natural shade (Alende, 2011).
Excessive Mud	An increase of up to 33% in energy requirements, to the detriment of ADG, which increases maintenance energy and reduces the amount available for growth; an increase of 20% to 33% in the feed required per kg of weight gained; and a greater difficulty in accessing feed bunks and waterers (Pordomingo, 2003).	- Construction of mounds or dirt bedding areas (Alende, 2011). - improvement of pen drainage (Alende, 2011). - and the use of ballast or concrete flooring in critical areas (Banchero *et al.*, 2016).
Abrupt Dietary Transition	- A high incidence of ruminal acidosis, which is the main cause of mortality (44% of deaths in Uruguayan pens) (Banchero *et al*., 2016), and an increase in liver abscesses, the leading cause of liver condemnation at the packing plant, which negatively impacts feed conversion efficiency (Nagaraja & Chengappa, 1998).	- Longer and more gradual dietary adaptation protocols (the average in Uruguay is 14 days) (Banchero *et al*., 2016); correct bunk management to prevent erratic intake; and the inclusion of adequate levels of effective fiber in the ration (Espinoza, 2023).

Meeting Points: Welfare as a Strategic Investment

The evidence demonstrates that, far from being antagonistic concepts, economic efficiency and animal welfare are intrinsically linked. Ignoring animal welfare is not only an ethical failure, but also a poor business decision.

- **A stressed or sick animal is not productive.** Heat stress reduces ADG. The energy expended to combat cold and mud decreases the energy available for growth (Pordomingo, 2003). Acidosis and hoof problems depress intake and feed conversion efficiency, which directly impacts the key business indicator (Nagaraja & Chengappa, 1998).
- **Losses are direct costs.** Every animal that dies from acidosis represents a direct economic loss (Banchero *et al*., 2016). Livers condemned due to abscesses reduce carcass value (Nagaraja & Chengappa, 1998).
- **Prevention is more profitable than treatment.** Investing in good pen design and meticulous dietary management prevents major losses in the long term (Alende, 2011). Good bunk management is one of the practices with the highest impact and lowest cost to maximize efficiency (Espinoza, 2023)

- **Market demand.** Growing consumer concern over animal welfare translates into regulations and market access barriers for the most valuable markets. Uruguay's ability to demonstrate high welfare standards is a key competitive differentiator (Huertas *et al.*, 2014).

Concluding Remarks

The true challenge is not choosing between profitability and welfare, but understanding that maximum sustainable economic efficiency is only achieved when animal welfare is a non-negotiable pillar of the system. A healthy, comfortable, and stress-free animal is an animal that converts feed more efficiently, gains more weight, and represents a lower risk of losses.

This analysis is, therefore, a call to action for producers, technicians, advisors, and institutions. It is imperative to:

I. Invest in Basic Infrastructure. Prioritize the provision of shade and the improvement of pen flooring, not as a luxury, but as a strategic investment with a high return on productivity and resilience.

II. Strengthen Technical Management. Reinforce and standardize dietary adaptation protocols and daily bunk management to reduce the incidence of metabolic disorders, the leading cause of death in Uruguayan feedlots.

III. Integrate Welfare into the National Strategy. Accept that high animal welfare standards are an essential component of the "Uruguay Natural" country brand and a key factor for gaining and maintaining access to high-value markets.

By addressing these challenges head-on, the feedlot sector in Uruguay will not only improve its efficiency and profitability, but will also honor and strengthen the country's brand image: a beef production that is synonymous with quality, not only in the final product, but throughout the entire process that makes it possible.

CONCLUSION

Feedlot finishing is a well-established reality and a vital economic tool for the Uruguayan beef sector. Its growth responds to an inescapable market logic and has allowed the country to maintain its position in a demanding global arena. However, data shows that there are significant gaps regarding animal welfare, particularly in areas of basic infrastructure and health management. This is not an abstract or purely ethical debate; it has direct economic consequences and affects the sustainability and reputation of the entire production chain.

LITERATURE CITED

ALENDE M. 2011. Bienestar Animal y reducción del estrés en el feedlot. Instituto Nacional de Tecnología Agropecuaria*. Sitio Argentino de Producción Animal.* 57:1-6*.* https://www.produccion-animal.com.ar/etologia_y_bienestar/bienestar_en_bovinos/57-feedlot.pdf

ARIAS DÍAZ MV, Rucks Montoya PM. 2012. Análisis comparativo de tres productores de feedlots en los departamentos de Flores y Soriano en Uruguay. Tesis de Ingeniería en Administración de Agronegocios, Escuela Agrícola Panamericana, Zamorano. Honduras. Pp. 37. https://bdigital.zamorano.edu/handle/11036/917

BANCHERO G, Chalkling D, Mederos A. 2016. Relevamiento de problemas sanitarios y de manejo durante la terminación en bovinos en sistemas de confinamiento en Uruguay. *Veterinaria (Montevideo)*. 52(202):4-13. http://www.scielo.edu.uy/scielo.php?script=sci_arttext&pid=S1688-48092016000200001

BLASCO A, Mateu AB. 2011. Ética y bienestar animal. Ediciones Akal. https://www.ciap.org.ar/Sitio/Archivos/Etica%20y%20Bienestar%20Animal.pdf

CLARIGET JM, Kelly AK, Banchero G, Keogh K, Kenny DA, Crosson P. 2024. Profitability, greenhouse gas emissions and feed-food competition of strategies to exploit compensatory growth in Uruguayan weanling-to-beef systems. *Livestock Science.* 288, e105553. https://doi.org/10.1016/j.livsci.2024.105553

CONFALONIERI OE, Moscuzza H, Rodríguez EM, Passucci JA. 2016. Patologías podales en ganado lechero y en feedlot del partido de Tandil, provincia de Buenos Aires, Argentina. *Revista de la Facultad de Medicina Veterinaria y de Zootecnia.* 63(1): 11-19. http://www.scielo.org.co/pdf/rfmvz/v63n1/v63n1a02.pdf

COSTABEL VH. 2020. Efecto del estrés calórico en el bienestar animal y la producción. *Plan Agropecuario.* 176:25-27. https://www.planagropecuario.org.uy/uploads/magazines/articles/191_2972.pdf

ESPINOZA Alemán EDM. 2023. Seguimiento al cumplimiento de protocolos de manejo y sanidad animal establecidos en Feedlot finca El Rancho (Nuevo Carnic S.A), febrero – agosto 2023. Tesis de Licenciatura. Facultad de Ciencia animal. Universidad Nacional Agraria. Nicaragua. https://cenida.una.edu.ni/Pasantia/panl70a367.pdf

FRADE S, Fernández Turren G, Diéguez F**.** 2025. Cuota 481: Principales variables en el negocio de engorde a corral de bovinos en Uruguay. *Archivos Latinoamericanos de Producción Animal*. 33(1):e17. https://ojs.alpa.uy/index.php/ojs_files/article/download/3462/2131

HUERTAS S, Gallo C, Galindo F. 2014. Motores de las políticas de bienestar animal en las Américas. *Rev sci tech Off int Epiz.* 33(1):55-66. https://www.academia.edu/download/83484977/Drivers_of_animal_welfare_policy_in_the_20220408-15043-1empwp9.pdf

NAGARAJA TG, Chengappa MM. 1998. Liver Abscesses in Feedlot Cattle: A Review. *Journal of Animal Science*. 76(1):287–298. https://doi.org/10.2527/1998.761287x

NIN-PRATT A, Freiría H, Muñoz G. 2019. Productivity and efficiency in grassland-based livestock production in Latin America: The cases of Uruguay and Paraguay. *Inter-American Development Bank*. Working Paper Series No. IDB-WP-1024. https://doi.org/10.18235/0001924

PORDOMINGO AJ. 2003. Gestión ambiental en el feedlot. Guía de buenas prácticas. Sitio Argentino de Producción Animal. Pp. 90. INTA Anguil, Argentina. https://www.produccion-animal.com.ar/informacion_tecnica/invernada_o_engorde_a_corral_o_feedlot/19-gestio_ambiental_feedlot.pdf

WAGNER JJ, Archibeque SL, Feuz DM. 2014. The modern feedlot for finishing cattle. *Annual Review of Animal Biosciences*. 2:535-554. https://doi.org/10.1146/annurev-animal-022513-114239