Future of Sustainable Beef in the United States

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Resumen
¿Cómo se visualiza el futuro de la industria de la carne de bovino en EU y, en tal caso, para toda América del Norte? ¿Será sustentable? ¿Qué se debe entender por una producción de carne de bovino sustentable? Con inventarios de ganado en su nivel mínimo en los últimos 50 años, precios de los granos a un máximo histórico junto con precios al consumidor de la carne de res y el consumo per cápita en una marcada tendencia a la baja, estas preguntas adquieren una relevancia singular. La única certeza que se puede atribuir a la industria de la carne de bovino en el futuro mediato es la incertidumbre. Históricamente la actividad ganadera ha implementado prácticas a favor de una reducción de su impacto negativo en el ambiente por unidad de producto. Mayor atención deberá ponerse en la disminución de pérdidas a lo largo de toda la cadena, con lo que se apoyará en su sustentabilidad. A final de cuentas, un futuro sustentable de la industria de la carne de bovino no está garantizado, pero como lo muestra su comportamiento pasado, la industria tiene la enorme capacidad de adaptarse y evolucionar ante los retos de hoy, lo que da pie a contemplar un futuro optimista.

Palabras clave
Carne de bovino, EEUU, escenario, sustentabilidad.

Abstract
What will the future beef production look like in the United States, and, more broadly, North America? Will it be 'sustainable'? What does sustainable beef production mean? With cattle inventories at their lowest levels in over 50 years, grain prices reaching record highs in the past few years, retail beef prices at all-time highs, and per capita consumption of beef in the US on a steady decline the past 35 years, these questions are more pressing and relevant than ever. It seems the only certainty the beef industry will have over the long-term is uncertainty. The US beef industry has made significant historical changes which have reduced the environmental impact per unit of beef substantially. Future scientific and technological advancements would likely further this historical trend of continuous improvements in production efficiency. Reducing food waste, and ultimately, waste at all phases of the beef production chain, may be one of the best opportunities to improve the sustainability of the beef industry. Ultimately, the future sustainability of the beef industry is not certain, but as the past illustrates, the beef industry has a tremendous ability to adapt and evolve to the issues of the day, which makes optimism for the industry’s sustainability a realistic outlook.

Keywords
Beef, USA, scenario, sustainability.
Introduction

What will the future beef production look like in the United States, and, more broadly, North America? Will it be ‘sustainable’? What does sustainable beef production mean? With cattle inventories at their lowest levels in over 50 years, grain prices reaching record highs in the past few years, retail beef prices at all-time highs, and per capita consumption of beef in the US on a steady decline the past 35 years, these questions are more pressing and relevant than ever. It seems the only certainty the beef industry will have over the long-term is uncertainty.

However, these are not new questions that the industry is facing. Case in point: [...] raises in the mind of thoughtful economists the question as to whether the beef cow is to go the way of the buffalo and whether the rich beef steak is to become a delicacy to be found only on the tables of the wealthy. Will the beef-cattle industry pass from the stage of American agriculture, or will it, like the human pioneer adapt itself to changing conditions and become a part of the newer civilization of more intensive agriculture?

Clearly, the US beef industry overcame the issues in King’s time and avoided extinction (and it should be noted, so did the American Bison). However, it adapted and evolved into a much different industry compared to its 1920’s form, and in King’s words became a part of “more intensive agriculture.” While it is impossible to know exactly how the beef industry will continue to evolve in the next several decades, this paper will outline some of many issues and potential drivers of the industry’s future evolution as it relates to sustainability.

Sustainability: What does it mean for the beef industry?

Sustainability has become a buzzword in recent years, but there is still no universally accepted definition. Sustainable animal agriculture has the same definitional ambiguity, with many competing visions for what sustainable animal agriculture entails. One of the more commonly accepted concepts of sustainability is the ‘triple bottom line—people, planet, profit’ (Elkington, 2004). Using this framework, we can think of sustainability as having three pillars, social, environmental, and economic, all of which need to be strong for the industry, individual business, or other entity to be sustainable. Building on this concept, sustainable beef production can be defined as producing safe, quality beef with long-term economic viability, stewardship of natural resources, and responsibility to community, family, and the animals.

Production efficiency

As alluded to above, the US beef industry has undergone dramatic changes in the past several decades. The adoption of new technologies in all phases of beef production from grass to plate has been a major driver of change and enhanced the production efficiency
of the industry. Production efficiency can be defined as minimizing the inputs (e.g. feed, fossil fuels) and undesirable outputs (e.g. greenhouse gases, negative impacts on water quality) to produce a given quantity of beef (Place and Mitloehner, 2010). In 2013, US cattle inventories (all cattle and calves) have dropped to 89.3 million head their lowest levels since 1952, and significantly down from the all-time high in 1975 of 131.8 million head (USDA, 2013a). However, beef production has not dropped in that same timeframe, but rather remained quite constant. Slaughtered beef totaled 11.5 billion kg of beef in 1977 and was 11.8 billion kg in 2012 (USDA, 2013c). The production efficiency of the industry has substantially improved, as the US now produces the same amount of beef with 30% fewer cattle than were required in the late 1970’s. Capper (2011) undertook an environmental analysis of the US beef industry comparing resource use and pollution impacts from beef production in 1977 to 2007. In comparison to the 1977 industry, 2007 beef production required 12% less water, 33% less land, 19% less feed, and produced 16% fewer greenhouse gases emissions (a concern for climate change) per unit of beef (Capper, 2011).

These improvements are mostly driven by the fewer cattle required to produce the same of beef when compared to past herds. The improvement in production per animal has been driven by many factors including genetic improvements, advances in nutrition and management, and biotechnologies (e.g. ionophores, beta-agonists, growth implants). Stackhouse-Lawson et al. (2012, 2013) found, in both modeling and experimental studies, reduced greenhouse gas and ammonia (a concern for air quality) emissions per unit of beef (i.e. hot carcass weight) for animals that were treated with feed additives (ionophores and antibiotics), implants, and beta-agonists compared to ‘natural’ cattle (i.e. those without any of the aforementioned technologies). It should be noted most of these growth-promoting technologies are used to improve profitability of beef cattle operations; therefore, their use can be seen as addressing both the economic and environmental pillars of sustainability. Regarding future improvements in production efficiency, whether through genetics, nutrition, management, or biotechnologies, it seems likely the historical trends will continue over the next few decades. However, there are some doubts regarding the consumer acceptance of existing and future biotechnology use in the beef industry, which is a part of the social pillar of sustainability.

Beef consumption and waste
As alluded to above, US per capita consumption of beef has been falling since the late 1970’s, while the US population has grown by slightly over 100 million people in the same time-frame (see Figure 1). US poultry consumption per capita (chicken and turkey) meanwhile has grown, going from 33 grams in 1970 to 69 grams per day in 2010 after adjustments for loss (USDA 2013b); however, poultry consumption per capita has dipped slightly in recent years. There are many factors that could be contributing to the decline in beef consumption and the rise in poultry consumption, including concerns of the red meat’s contribution to health problems (particularly heart disease), and the recent increases in retail beef prices limiting US consumers’ ability to purchase beef.
Globally, beef and all other animal protein consumption is expected to increase 73% from year 2010 levels by the year 2050, with most of the increasing demand coming from developing countries (UN FAO, 2011). From a US perspective there may be more opportunity to grow beef exports; however, there are many trade and cultural barriers preventing the rapid expansion of US beef exports. In fact, US beef exports have essentially spent the last 10 years recovering from the dramatic export market losses following the December 2003 incident of a US cow being diagnosed with bovine spongiform encephalopathy (US MEF, 2013). Predicting trade policy shifts over the next several decades is problematic, though it is likely that any major increases in US beef industry exports to meet growing global demand will impact the industry’s sustainability from an economic perspective.

Another often over-looked aspect to US beef’s sustainability is food waste. Total edible beef losses from retail, foodservice, and consumers in the US are estimated to be 16% (Kantor et al., 1997). The losses of boneless beef estimated by the USDA Economic Research Service can be seen in Figure 1. Reducing losses of edible beef could potentially greatly enhance the sustainability of the US beef industry, when considering the environmental, economic, and social impacts of beef production per unit of edible beef consumed. Edible beef waste represents a loss of all its human nutritional value and means all the feed, energy, water, etc. required to produce the wasted beef has been used for naught. Reducing losses could potentially help provide nutrients to food insecure people (49 million Americans in 2012; Coleman-Jensen et al., 2013).

Figure 1
Boneless beef per capita availability with and without adjustments for losses and US population.

Alternatively, food waste could be diverted from landfills (where it would contribute to greenhouse gas emissions) to anaerobic digesters where the potential energy in the wasted beef could be partially captured and used. Reducing edible beef waste would likely
have the net effect of further reducing the number of cattle and natural resources required to meet consumer demand for beef. Making significant advancements on reducing food waste will be dependent on substantial public awareness efforts and policy changes; however, any significant reduction in edible beef waste would improve the US beef industry’s sustainability.

Conclusions

The sustainability of the US beef industry encompasses social, economic, and environmental considerations, all of which must be addressed and balanced for the industry to be sustainable. The US beef industry has made significant historical changes which have reduced the environmental impact per unit of beef substantially. Future scientific and technological advancements would likely further this historical trend of continuous improvements in production efficiency. Consumer acceptance and perceptions will likely play an ever greater role in US beef production practices, which could lead to either positive or negative impacts on the industry’s sustainability. Reducing food waste, and ultimately, waste at all phases of the beef production chain, may be one of the best opportunities to improve the sustainability of the beef industry. Ultimately, the future sustainability of the beef industry is not certain, but as the past illustrates, the beef industry has a tremendous ability to adapt and evolve to the issues of the day, which makes optimism for the industry’s sustainability a realistic outlook.

Cited literature