Profitability of Growth-Enhancing Technologies in the Canadian Feeder Cattle Industry

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INTRODUCTION

The beef industry has been using growth-enhancing technologies (GETs) for over 50 years, thereby aiding the efficiency and sustainability in production. These GETs are seen in various forms, however, this research only examines hormonal implants, beta-adrenergic agonists and melengestrol acetate. Studies dating back to the 1960s have found greater animal performance measures such as average daily gain, dry matter intake, gain to feed ratios, hot carcass weights and quality grades when using GETs while simultaneously improving inputs requirements (i.e. water, land, feedstuffs, animals) and levels of greenhouse gasses emitted.

Despite approval and regulation of GETs within beef production, some regulatory bodies have banned their use and trade ability (i.e. EU, Russia, China) due to precautionary health concerns. Consequently, disputes have occurred between trading countries (EU and Canada) which resulted in the development of CETA in 2017 – an agreement allowing a 50,000-tonne quota of tariff-free and GET-free Canadian beef into the EU. Although CETA creates an alternative beef market, there are strict guidelines to qualify and associated increased production costs accompanying the opportunity.

Recently, in 2021, the beef sector received the lowest profit margins in the agriculture industry at $0.05/dollar of revenue, while also seeing increasing retail prices (66% from 2013 to 2023). Paired with the decreasing trend in Canadian beef consumption (34% from 1980 to 2022), feedlots are left extremely sensitive to financial decisions which can force producers to explore alternative market opportunities and seek higher profit margins.

DATA & METHODOLOGY

A partial enterprise budget is first used to account for the costs that vary between production systems specifically the feed, supplement, treatment and the cost of the feeder calves and fed cattle, which also vary between heifers and steers. The partial budget stems from the theory of expected profit maximization.

A sensitivity analysis is subsequently used to evaluate how sensitive base-case results are to prices of feed, supplements, treatments and feeder calf and fed cattle prices. This analysis applies a 10%- and 20%-unit price increase and decrease to key variables.

These methods used data from various sources, the largest being from a completely randomized design feeding trial that was conducted over four years (2016-19) at the Agricultural and Agri-Food Canada (AAFC) Lethbridge Research and Development (R&D) Center. The trial included 10 pens with 10 head per pen for both steers and heifers and consisted of 880 British x Continental crossbred beef calves – 80 steers and 120 heifers in year one and two; and 120 steers and heifers in year three and four. Ribeiro et al. (*2021 Cdn J of Animal Science*) provides a thorough overview of the experiment.

Treatments administered in the AAFC Lethbridge R&D trials:
- Non-conventional/GET-free (Control) – steers and heifers
- Trenbolone acetate (TBA implant) – steers and heifers
- Melengestrol acetate (MGA feed additive) - heifers only
- Ractopamine hydrochloride (RAC; Optaflexx feed additive) – steers only

Data (source):
- 10-year average prices for Alberta feeder calves (CanFax)
- 4-year average (actual) price paid for live weight finished calves (AAFC Lethbridge R&D Center)
- 5-year average (actual) prices paid for feed, supplement and treatment (AAFC Lethbridge R&D Center)

OBJECTIVES

Primary: determine the relative profitability of Canadian beef cattle production systems using GETs (conventional) versus without (unconventional) the use of GETs in the feedlot phase.

Secondary: determine the sensitivity of results from incremental price fluctuations in key variables. These objectives will be achieved by using replicated animal performance measures previously calculated by Ribeiro et al. (2021).

DATA ANALYSIS

Data was exported and manually input into SAS to build the partial budget. The key variables of focus show the most variation between each treatment and thus, are representative of each production system. Variations are displayed in a table using the PROC REG procedure under the classes of gender, treatment and, for a more thorough interpretation, year.

To simulate a sensitivity analysis, unit prices were manually increased and decreased by 10% and 20% in SAS and recorded in Excel.

Table 1. Measures of average animal performance data over the four-year experiment

	Heifers			Steers		
Animal Variable	**Control**	**TBA**	**MGA**	**Control**	**TBA**	**RAC+TBA**
Beginning date[1]	March 6	March 6	March 6	March 6	March 6	March 6
Beginning weight (lb/hd)[1]	906.26	906.26	906.26	932.72	932.72	932.72
Ending date[1]	August 2	August 2	August 2	August 2	August 2	August 2
Ending shrunk live body weight (lb/hd)[1]	1332.20a	1,423.87c	1,372.66d	1,387.35a	1,544.12b	1,585.50b
Dry matter intake (lb/hd)[1]	21.61a	23.33b	21.90a	21.79a	24.61b	25.45c
Hot carcass weight (lb/hd)[1]	796.45c	865.26a	833.08a	844.79a	938.66b	971.38c
Average daily gain (lb/hd)[2]	2.85c	3.47d	3.12a	3.05a	4.11b	4.27b
Total gain (lb/hd)[2]	425.94a	517.61b	466.40c	454.63d	611.40e	652.78a
Difference in total gain relative to control treatment (lb/hd)[2]	Base	91.67	40.46	Base	156.76	198.14
Increase of total gain relative to control treatment (%)[2]	Base	21.52	9.50	Base	34.48	43.58

[1] Directly from Ribeiro et al. (2021)
[2] Calculated in SAS using input data from Ribeiro et al. (2021)
a-e Different letters indicate mean values are statistically significant

Table 2. Measures of economic performance in feedlot partial budget

	Heifers			Steers		
Economic Variable	**Control**	**TBA**	**MGA**	**Control**	**TBA**	**RAC+TBA**
Feeder calf purchase ($/lb)	1.67	1.67	1.67	1.82	1.82	1.82
Feeder calf price ($/hd)[1]	1566.06	1566.06	1566.06	1756.55	1756.55	1756.55
Grain ration ($/hd)	227.43	245.52	230.47	229.31	258.99	275.45
Supplement ($/hd)	26.48	28.59	35.34	26.70	30.16	32.07
Optaflexx ($/hd)	0	0	0	0	0	98.45
Implant ($/hd)	0	5.56	0	0	5.56	5.56
Interest on operating capital ($/hd)	4.42	4.87	4.63	4.46	5.13	7.37
Total cost ($/hd)	1,824.40	1,850.59	1,836.50	2,017.02	2,056.39	2,177.13
Gross revenue ($/hd)[2]	2,005.98	2,183.01	2,098.20	2,126.27	2,371.45	2,359.49
Net return ($/hd)	181.58	332.42	261.70	109.25	315.06	182.36
Net return relative to control ($/hd)	Base	150.84	80.11	Base	205.81	74.80

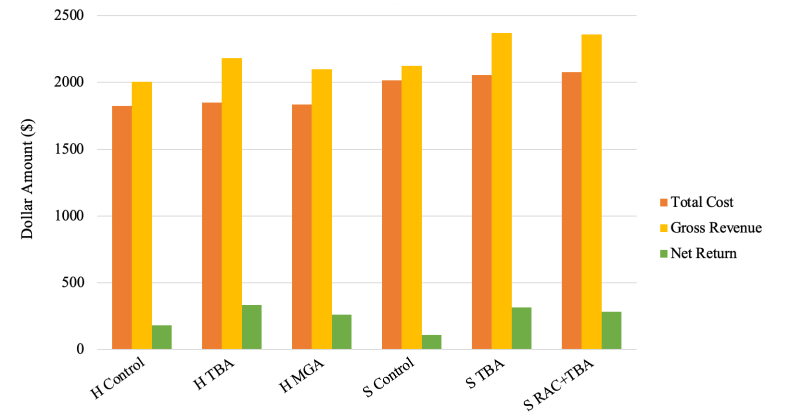
[1] Feeder calf price value includes interest on owning feeder calf during feeding period
[2] Gross revenue is the price received from packer on a per hundredweight valuation of the HCW

KEY FINDINGS

The animal performance results favored the RAC+TBA treatment group for steers with a 43.6% increase in total gain; and the TBA treatment group for heifers with a 21.5% increase in total gain.

Contrarily, the economic performance results favored the TBA treatment group for both steers and heifers, seeing a 188.4% and 83.1% increase in net returns relative to the control group, respectively.

Figure 1. Economic performance for gender and treatment groups



The sensitivity analysis suggests that relative net returns are largely driven by animal performance which is therefore driven by treatments administered. For all incremental ceterus paribus changes, the most economical treatment was found to be the TBA implant for heifers and steers.

Sensitivity results of the *relative* net returns* for key variables:
- Supplement mash with and without MGA – not overly sensitive
- RAC feed additive – not sensitive
- Grain ration – not sensitive
- Feeder calf and fed cattle prices – not sensitive

*Net returns for key variables are not sensitive except for feeder calf and fed cattle prices which are quite sensitive to price fluctuations.

LIMITATIONS LEADING TO FUTURE RESEARCH

The creation of a grid pricing scheme using the characteristics and quality grades recorded would allow further interpretation of the monetary benefits derived from treatment use at the feedlot level. This grid can be incorporated into a supplementary risk analysis to estimate each treatment's net return probability distribution.

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