

EFFECT OF A CHANGE IN PRICE RELATIONSHIPS ON TRAIT EMPHASIS WHEN SELECTING COMMERCIAL BEEF BULLS

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SUMMARY

In the future beef producers could face increased competition from industrial users of North American corn. This would impose a long-term increase in the price of feed for livestock production. The impact of a permanent change in the price of feed on the emphasis of traits in two multi-trait selection procedures is described. Line A considered current market conditions while Line B considered a speculated future consumer demand for a smaller portion, highly marbled product. With increased feed prices emphasis on traits related to **feedlot** efficiency, such as feed intake, and decreased mature size, such as back fat thickness, increased while emphasis on growth traits, as they relate to increased mature size, decreased for both breeding lines.

Keywords: beef cattle, selection, economics, forecast prices.

INTRODUCTION

Many new industrial uses for corn were developed in the late 1970's due to a steady decline in the real (inflation adjusted) price of corn. This led to an increase in the quantity of corn used by industries from 9% to 20% of total U.S corn usage between 1976 and 1995 (National Corn Growers Association (NCGA) 1997). Over the same period the real prices of industrial goods which use corn as an input (beverages, alcohol, baking products) kept pace with the consumer price index while the real price for beef declined over the same period (United States Board of Labor Statistics 1995). A continuation of this divergence in returns to production for these two sectors, over the long run, will lead to an increase in the industrial users ability to pay for corn while livestock feeders experience a decreased ability to pay. Average annual prices for corn are calculated by the NCGA and show that the real price of corn was at an all-time low in 1987 but has since increased 10-25%. As the returns to growing corn increase, more land is planted into corn and higher rental rates are paid for corn land. 'With' increased rental rates, the profitability of crops which could replace corn in livestock rations, such as soybeans, oats, barley and hay, decreases and less is produced. A decrease in supply of substitute crops increases their price. This price increase would also apply to pasture as crops are grown on increasingly marginal land.

Feed costs represent the major expense of beef production (Klosterman 1972). The impact a change in the feed price or the beef feed price relationship has on the profitability of the beef enterprise has previously been studied (Morris and Wilton 1975; McMorris et al. 1986; Bourdon and Brinks 1987; Kolstad 1993; Koots 1994; Melton 1995). Of these, only Koots

(1994) looked at the effect of a permanent change in feed prices on selection in an integrated operation. He found that with increased feed prices, residual feed intake during both the growth and mature phases, replaced calf survival as the most economically important traits and that the economic value of fertility and a smaller mature size also increased. Changes in the economic value of individual traits due to changes in prices has, probably, not been intensively studied because of the instability of prices over long periods of-time. The fluctuations of prices over short periods of time have, in the past, made altering a breeding program to optimize the change unnecessary. However, current market information reveals the potential for continually increasing feed prices for North American beef producers.

Developments in selection procedures for beef sires, based on a combination of economically important traits, have been developed in a companion paper (Wilton et al. 1998). This paper looks at the change in the emphasis on these traits in two breeding lines in response to a change in feed prices.

MATERIALS AND METHODS

The bio-economic model, as described in the companion paper by Wilton et al. (1998), for selecting commercial beef bulls calculated the difference in profit from an average bull generated from 2 years use on 30 cows and referred to as Net Economic Value (NEV). This was done for 2 lines based on their genetic evaluation for 8 traits. Traits included were Birth Weight (BW), Maternal Weaning Gain (WG-M), Weaning Gain (WG), Post-Weaning Gain (PWG), Feed Intake (FI), Back Fat Thickness (BFT), Scrotal Circumference (SC), Rib-Eye Area (REA), and Intra-Muscular Fat (IMF).

Line A produced a carcass for the current marketing situation' and prices. while Line B targeted an animal with superior maternal traits and a highly marbled carcass with premiums paid based on a forecast demand for a lighter weight carcass with extra marbling. Revenues in the model were calculated using a base carcass price of Cdn\$1.82/kg (US\$62.70/cwt.). A price grid was then used to assign a price per unit of carcass depending on the carcass weight and degree of marbling.

The steer (U.S.\$ /cwt.): corn (U.S.\$/bu.) ratio is the most common expression of the beef feed price relationship due to the simplicity of the calculation and the availability of information. This ratio allows for long-run comparisons of the economic situation facing cattle producers. As the ratio decreases, the profit margin for feeding cattle also decreases. The steer:corn ratio has steadily declined from 44 in' 1987, when corn price were low, to below 30 since 1995.

The impact of changes in the beef feed price relationship on trait emphasis in the selection procedure described by Wilton et al. (1998) was determined by both increasing and decreasing feed costs by 20% holding beef prices constant. Relative trait emphases were calculated for both breeding lines by increasing each trait by 0.1 genetic standard deviation and-measuring the change in NEV using the base, high and low feed costs separately

Base feed costs were calculated from **Cdn\$118/tonne (US\$2.28/bu.)** corn, providing a steer: corn ratio of 27.5. A 20% increase in the corn price to **Cdn\$142/tonne (US\$2.74/bu.)** decreases the ratio to 22.9. A 20% decrease in the corn price to **Cdn\$94/tonne (US\$1.82/bu.)** increased the ratio to 34.4. The corn prices used provided a **feedlot** ration at the base price of **Cdn\$0.047/Mcal ME**, a high price of \$0.058 and a low of \$0.038 with corresponding increases in pre-weaning, herd replacement, and mature cow maintenance feed costs.

RESULTS AND DISCUSSION

In Line A the largest changes in trait emphasis due to increased feed price occurred in **BFT** and **FI** (Table 1). The value of **BFT** increased showing the economic advantage of decreased days to market finish and smaller mature size. The value of **FI** increased due to the feed savings through decreased feed consumption in the **feedlot**. The economic importance of both direct measures of growth (**WG**, **PWG**) decreased as the price of feed increased as increasing growth was related to larger mature size. **WG-M** also decreased with an increase in feed prices due to the increased costs of providing energy to the cow.

The results for Line B are similar to Line A with **BFT** and **FI** being impacted the most by a change in feed price, however, the magnitude of the change and the re-ranking of these traits was more pronounced. A change in the direction of emphasis was observed for **BFT** with a change in feed price. The price grid determines the carcass weight and marbling grade which receives the maximum price per unit of product. **However, with** changing feed costs, the carcass weight for maximum profit changes. Changing feed costs also impact the optimal carcass weight as it relates to **mature cow size**. **PWG, WG, and WG-M all decreased** in a similar manner to Line A, with the increase in feed price.

These results are similar to Koots (1994) with increased emphasis on **FI** and a smaller mature size with an increase in feed prices. The results of this study show the sensitivity of trait emphasis in two multi-breed selection procedures to changes in feed prices. Feed prices affected traits related to feed consumption (**FI**) directly as well as those related to mature size such as growth and finishing ability. **Back Fat Thickness as it relates to mature size** was most notably affected with changing feed prices changing direction of emphasis.

A speculated market for one of the breeding lines and a forecast trend in feed prices was examined. The inclusion of forecast trends in breeding objectives is questionable due to the risks involved. However, it will be the costs and revenues of future market factors that will determine the profit potential of long term breeding programs, not the current market situation. The forecasting of markets is difficult and somewhat speculative however, if the effect of long-run trends such as new beef markets, increasing feed prices, or decreasing beef revenues are to be optimized, the inclusion of these **potential trends in the breeding** objective needs to be examined further.

Table 1. Change in Net Economic Value with 0.1 genetic standard deviation increase in traits for two breeding lines under various price relationships

Trait*	Line A			Line B		
	Deviation of feed price from base			Deviation of feed price from base		
	0	+20%	-20%	0	+20%	-20%
	(change in NEV ^B bull ⁻¹)			(change in NEV ^B bull ⁻¹)		
WG	78	69	88	75	58	92
WG-M	15	12	19	39	34	49
PWG	106	102	110	113	104	123
BFT	13	54	(29)	30	93	(33)
FI	(60)	(71)	(47)	(76)	(91)	(60)

^A Weaning Gain, Weaning Gain-Maternal, Post Weaning Gain, Back Fat Thickness, Feed Intake

^B Net Economic Value

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