

Beef Production in the New Era Do the Old Rules Apply?

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Introduction

Genetic progress in multiple traits is difficult when the goal is clearly defined. It is even more difficult if the goal is a moving target due to changing consumer preferences or producer-cost structure. Commercial beef producers recognize that genetic decisions should be based on long-term profitability, but they live in a short-term world where profitability varies widely from year to year due to fluctuations in input and output prices. Fed cattle prices averaged under \$70 from 1988-2002 and averaged over \$87 during 2003-2008. Similarly, feeder cattle prices have averaged higher in recent years compared to the pre-2003 era. Record high grain prices last summer and the collapse of consumer demand and the stock market late in the year; put 2008 in the books as the worst cattle feeding year on record. Feeder cattle and calf prices fell as feedlots searched for opportunities to rebuild lost equity.

Was 2008 an outlier or is it the new norm? From renewable energy to rejuvenating the economy there are significant changes in U.S. policy that directly or indirectly impact cattle producers, but do these changes alter the goals that drive genetic selection? This paper will discuss two issues that are at the top of producers' minds and how they may impact the beef industry and genetic decisions. The first is the change in U.S. energy policy to expand the use of renewable energy and the expected impact on feed prices and land use. The second is the United States' current economic situation, including the economic recession, the proposed economic stimulus package, and changes in consumer behavior. After discussing these two issues, I will review the economics behind genetic selection and the importance of long-term relative prices in those decisions. Finally, I will revisit the question

of whether the old rules apply in this new world.

Emergence of renewable energy

The United States is one of more than 40 countries expanding production of biofuels. President Bush signed the Energy Independence and Security Act in December 2007, establishing the Renewable Fuel Standard (RFS) for the United States. The RFS is a schedule of production goals for four different classes of renewable fuels from 2009-2022. Most notable is that corn-based ethanol, with less than two billion gallons produced in 1999, is targeted to grow from approximately ten billion gallons in 2009 to 15 billion gallons by 2015. At current industry yields of approximately 2.8 gallons of ethanol per bushel, corn usage will be approximately 5.4 billion bushels of corn in 2015. Biodiesel has a carve-out mandate to grow to one billion gallons per year, limiting the incentive to change crop rotations to plant more corn. Cellulosic ethanol is mandated to grow to 16 billion gallons by 2022 from its current level of near zero.

Cellulosic ethanol is supposed to lessen the debate about food vs. fuel, but two challenges will linger. One, there is still a mandate for corn-based ethanol at 15 billion gallons. And two, while woody plants and waste products will be used, much of cellulosic feed stock under consideration is either currently feed for cattle or will compete for land that is producing grains or forages. In addition, one source of cellulose that some corn-based ethanol plants are considering is distiller's grains. They are high in cellulose, very consistent, and have no transportation or storage costs when used at the same plant.

Thus, new demand for grains and oilseeds will bid directly against exports and livestock, resulting in

higher feed costs for a given supply. Corn production will increase on improved yields and expanded acres, but average corn price is expected to be higher in a biofuel world than it was pre-2006. Cellulosic ethanol will create new demand and higher prices for forage and other low-quality feeds that have historically been fed to cattle. However, markets have a way of self-correcting and the new equilibrium prices for feedstuffs will not be as high as some would predict. Supplies of feed stocks will expand and the quantity demanded will decrease at the higher prices. Decreased demand for feed will result from reduced livestock and poultry production, which in turn will lead to higher prices for these outputs. Thus the new world is expected to have higher feed cost and higher cattle prices.

Economic recession 2008 — ?

In December 2008, the National Bureau of Economic Research (NBER) declared that the U.S. economy had been in a recession since the start of 2008, after 73 months of expansion. Unemployment posted record levels in early 2009 and the percent unemployed is the highest since the earlier 1980s. The GDP fell by 6.2% in the fourth quarter of 2008 compared to the same quarter in 2007, the largest quarterly decline since 1982 and the third largest since at least 1970. The stock market, most companies traded on it and nearly all investors in it saw a significant loss of equity.

From its peak in late 2007, to a recent low in March the Dow Jones Industrial Average fell by 50%. Credit markets seized up slowing

of Higher Prices and Higher Costs:

commerce and consumers whose spending represents over 70% of the U.S. GDP closed their wallets. Personal savings that was 8 to 12% of income in the 1980s hovered around 0% during 2005-07 and has grown to over 3% in the fourth quarter of 2008. While personal savings are good for the individual, it further slows spending including spending on food. U.S. expenditures on food posted a year over year decline in the fourth quarter of 2008, the first time since at least 1970.

Through the Federal Reserve and congressional bail-out programs the government has increased the money supply and cut interest rates in an attempt to free up credit for business and consumers. The Federal Funds Rate averaged 0.15% in January 2009 and some Treasury notes traded at 0% interest. The President and Congress are debating another stimulus package intended to spur the economy back to growth. There is a risk that when the economy does recover, inflation will be a problem and the cure for inflation is a higher interest rate. Farmers and ranchers remember all too well the interest rate whipsaw in the early 1980s and should be prepared for higher interest rates in the future. However, the first challenge is to move the U.S. and global economies from recession to expansion and consumer income and spending is a key variable.

Reduced consumer spending has hit beef demand particularly hard. Mintert, Tonsor, and Schroder (2009) report that on average, a 1% increase (decrease) in U.S. consumer total expenditures results in a 0.9% increase (decrease) in the quantity of beef demanded. This is a long-term elasticity estimate and in the short run changes could be even more dramatic. Retail beef prices have not increased as much as pork and poultry prices. Obviously, the supply of the three meats influences price, and poultry supply has declined further than beef at the boneless equivalent retail level. However, prices for beef middle meats have declined further than the price of ground beef, suggesting that if consumers aren't switching to other meats, they are at least trading down for lower priced beef

items. Again, supply must be considered, but comparing Dec '06 – Feb '07 to the same period this past winter shows that the Prime-Choice boxed beef price spread narrowed 39%. The "Branded beef" (upper two-thirds Choice) — Choice spread narrowed 57%, and the Choice-Select spread has narrowed 21%. Thus, the price of Prime and Branded beef decreased and Select increased relative to Choice beef price. At least part of the explanation is decreased food service demand for higher quality beef and increased demand for lower priced cuts at the grocery counter.

The beef price differential based on quality grades ultimately depends on supply and demand for the different grades and consumers substitute between the grades if the relative prices do not reflect their individual preferences. Consumers also substitute between beef, pork, and poultry and price is one of the factors in the decision. While the current recession has impacted consumer spending, it is doubtful but too early to tell if their preferences have changed enough that would result in a shift in beef demand even after the economy recovers. Clearly, the generation that lived through the Great Depression has a different attitude toward spending, savings, and economic priorities than do their grand children. Will the United States have a new society of frugal consumers?

Implications of genetic selection

How do higher feed costs, cattle prices and interest rates and lower differences between beef quality impact genetic decisions? Genetic selection indices have incorporated economic variables since at least Hazel (1943) where he argued that "Good approximations to relative economic values often can be obtained from long-time price averages and cost-of-production figures." Hazel, Dickerson, and Freeman (1994) later suggest that, "The economic weight should approximate the partial regression of cost per unit of enterprise output value on breeding value for each trait." Melton (1980) described the

objective of a cattleman is to maximize the present value of the stream of residual earnings from cows in the herd and concluded that prices and interest rates had a significant impact on the results. The author later suggested that breed evaluations should be expanded to include a broader range of input use values as well as the direct computation of multigenerational net present values under alternative scenarios regarding prices and prevailing production conditions (Melton and Colette, 1993). Lazenby et al. (1998) found that changing output and input price ratios does change the optimal trait emphasis. However, the results were not immediately obvious and depend on existing selection objectives as price relationships change.

This body of literature and common sense says that the economic returns earned by future generations of progeny should influence current genetic selection. Accurate forecasts of cattle and feed prices for years into the future are difficult under normal market conditions, and recent government policy decisions add to the uncertainty. However, it is important to recognize that market forces, producers and consumers reacting to new price signals, will move the cattle sector to a new equilibrium of production and prices that will provide producers with an economic return to sustain that level of production. That is, if cattle prices are not high enough to cover higher input prices more cows will be culled until supplies decline and prices increase. Likewise, if cattle production is profitable production will expand and push prices lower. In short, the cattle cycle will exist, albeit not in its mythical ten-year form.

While non-feed costs and technology adoption impact cattle production profitability, cattle and feed prices are the most important variables determining profitability. Because of the profit argument above, input and output prices will be positively correlated and in the long-run the ratio of the two will be more predictable than either price alone and provide breeders a more stable measure of future economic

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variables. **Figure 1** shows the steer:corn¹ and calf:hay² price ratios over time. Yes, they do vary and cycle, but there is relatively little trend over the 24 yet considered. The steer:corn ratio spends little time below 28 or above 38. The calf:hay ratio is most often between 1.0 and 1.4. On the demand side, **Figure 2** reports the retail price ratios for pork:beef and chicken:beef. These ratios are also relatively stable over time with only a slight downward trend indicating that beef prices are increasing relative to the other meats. The ratio of Choice to Select boxed beef prices does show a trend if measured from the early 1990s but, the ratio is not trending from 1994-2008 **Figure 3** It is in the 1.06 to 1.08 range most years.

One may argue that price ratios as described do not help breeders with selection decisions. First, the ratios are not substitutes for the net present value of the stream of future residual earnings from each cow as suggested by Melton (1980). Second, even if these price ratios continue in their historic ranges, the range is so wide as to not be an accurate forecast of future output or input prices. However, what the ratios show is that while cyclical and volatile, they have not trended significantly higher or lower over the past several years. When they do fall outside the range, market forces tend to bring them back toward the mean. The current upward shift in feed costs and fall in beef demand due to the recession are causing losses for producers and will push the ratio out of the range, but grain prices and beef supplies are already declining that will bring the ratio back toward the middle in the years ahead. Poultry and pork supplies are declining and will push their prices higher in the short term relative to beef.

¹Nebraska fed steer price (\$/cwt) divided by the national average corn price received by farmers (\$/bushel).

²Oklahoma City 400-500 steer calf (\$/cwt) divided by the national average alfalfa hay price received by farmers (\$/ton)

Beef cattle selection decisions should include economic weighting of the production traits or a simulation of future earnings from mating decisions. Either method is dependent on the forecast of prices for cattle, including premiums and discounts for genetically influenced traits and feed inputs. There have been recent "shifts" in prices for cattle, feedstuffs and consumer spending that have impacted at least current prices. Furthermore, government policy changes (Renewable Fuels Standard and economic stimulus package) have also occurred that raise questions about which prices to use when incorporating economic variables in selection indexes. While the change in policy will likely lead to new equilibrium prices for feedstuffs and cattle, the relationship between input and output prices will be such that the long-term economic returns to producers will be

Figure 1 Cattle / Feed Price Ratio

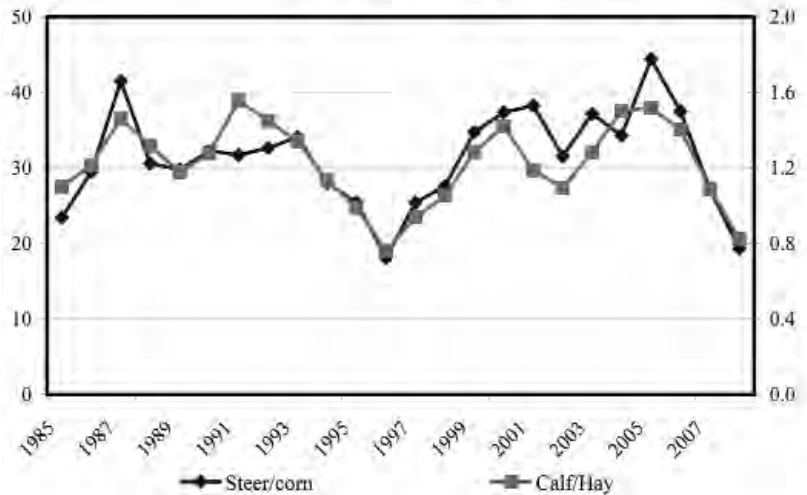


Figure 2 Retail Price Ratios

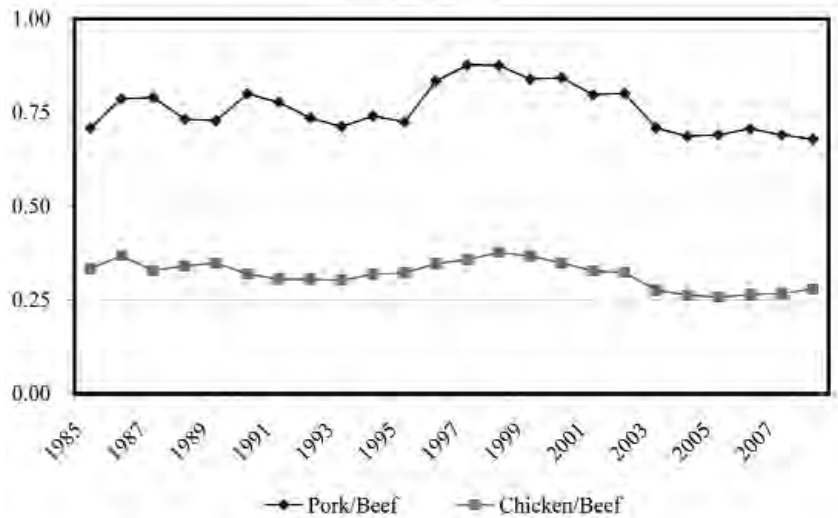
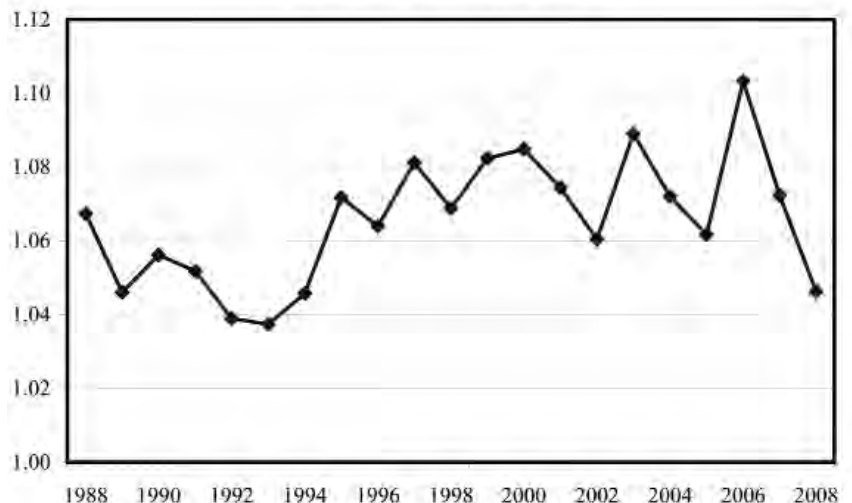


Figure 3 Boxed Beef Choice/Select Price Ratio



near historic levels. Returns that are too large (small) will lead to further expansion (contraction) of beef supplies. Likewise, consumers will substitute between beef, pork, and chicken to keep the relative prices in narrow ranges. The Choice/Select ratio similarly reflects the balance of supply and demand between quality grades. The price ratios demonstrated in this paper vary from year to year and show some cyclical tendencies but do not have a pronounced trend over the time period considered.

Short-term prices will deviate from the long-term relationship. These shocks will be addressed with short-term management decisions such as changing placement and marketing weights, ration formulation, culling and retention decisions. The implications are that at least for long-term decisions the economic weights and prices of the past are reasonable values for the future. Prices may be higher or lower, but the relationship of input to output prices is expected to be similar. Genetic selection needs to have a long-term focus and relative prices provide additional insight to these decisions.

I have not simulated selection indexes or calculated net present values using relative prices compared to independently forecast prices for cattle and feed inputs. I do, however, believe that the error for long term price forecast is smaller for relative prices than the individual prices. The question remains as to whether the error is large enough to result in a significant change in selection decisions that leads to undesirable traits in cattle. Are the cycles in prices long enough and predictable enough to improve genetic selection or do they result in the "right" cattle at the wrong time as prices move in the other direction. More research is needed, but given the relatively stable relative price relationships observed it appears that the old rules do apply in the new price world.

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