Marketing Opportunities for AI Bred Heifers and AI Sired Progeny

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The U.S. cattle inventory was at 87.7 million head at the beginning of 2014, the lowest inventory for the beef industry since 1951. Severe drought and sharply higher feed costs have led many U.S. cattle producers to downsize their herds in recent years. But as cattle markets have risen to record price levels in recent months, many producers will be looking to rebuild their herds to capture the expected future profits that today's strong beef demand levels and falling feed costs are pointing to. Genetics, production, and management decisions made in the near term will determine the future success of the beef industry. More importantly, beef producers must strive to provide products that will meet consumer desires in order to sustain and improve beef demand as that will ultimately drive the size of the cattle industry moving forward.

The short supply of cattle today combined with strong demand has led to record cattle prices that many in the industry would have never assumed possible just a few years ago. Missouri feeder cattle prices have exploded to over $2.50 per pound in 2014, which is over $1 a pound higher than year ago levels. To put this into perspective, Missouri 600 to 650 pound feeder steers were less than $1.00 a pound to start 2010. This nearly tripling of feeder cattle prices has had ripple effects throughout the cattle industry. The value of bred heifers and replacement females has also risen to record levels.

The case is being made by some in the industry that cattle inventories will not grow any time soon. Although the path to a larger cattle herd will take time, the positive economic signals are undeniable. The fact that beef cow slaughter is about 20 percent lower this year relative to 2013 is some indication that producers are holding cows in the herd for another year. The Livestock Marketing Information Center (LMIC) is currently projecting cow-calf returns at $490 per cow in 2014 and $482 per cow in 2015. For this agricultural economist, the old adage that the cure for high prices is high prices will eventually prove to be true yet again, but the amount of time that it will take for market adjustment to occur could take a while in this case.

It is important to consider some long-term expectations for cattle markets before analyzing the economic impact of AI bred heifers or progeny. In today's red hot market, every decision has been an economic winner for cow-calf producers the past few years. That may lead some in the industry to suggest any focus on genetic improvement is not valuable or needed. Taking that short-term view of cattle markets is dangerous as markets will adjust over time.

The value of any replacement female should be looked at relative to her future stream of expected returns. That future stream of returns is uncertain and risky. Risk enters this equation from both the production side through factors such as calves weaned and input costs and the output price side with the many uncertainties that exist with domestic and international beef demand.

Ultimately, the value of marketing opportunities for AI bred heifers or AI sired progeny rest in how markets returns are increased and/or economic risks are reduced through the use of genetic information. There is mounting evidence in the marketplace of the economic benefits attributed to the use of an AI program. Those that are investing now in superior genetic cattle may in fact be the ones best able to survive the next cattle cycle.

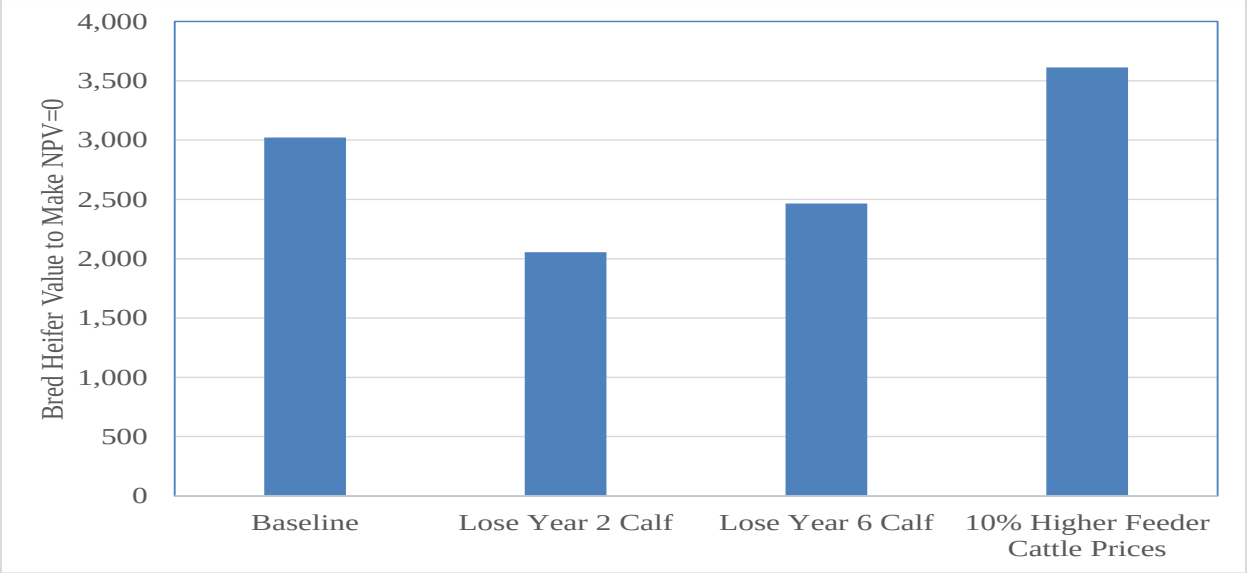
Net Present Value of AI Bred Heifers

Harlan Hughes (1999) reported that, "The timing of herd expansion, and the buying and selling of females, seem to be particularly critical to the long-run profitability of a beef cow herd." This statement has always been the case in the cattle industry with producers making herd decisions in the face of an uncertain future. Those that made a decision to expand at the "right" time found strong economic returns while those who expanded at the "wrong" time faced tough economic pressure.

Economic theory provides that a cow-calf producer should invest in herd expansion when the expected Net Present Value (NPV) of the stream of future returns exceeds the current market value of the female. The inherent problem is that future prices expectations play a pivotal role in the decision and producers find it difficult to assign cattle prices 8 to 10 years into the future. However, it may be instructive to look at the possible economic gains that can accrue to AI bred heifers relative to average heifers by examining the possible economic gains that result from a more predictable genetic base.

Nearly every land grant university has an online tool that automates the process of computing the NPV of a possible female herd addition. At the University of Missouri a replacement calculator can be found at: http:// beef.missouri.edu/tools/index.htm. Cow-calf producers can use this tool to estimate the return on investment of a cow purchase and calculate the break-even bid price for a cow. Also, they can use this tool to assist with the keep or cull decision by comparing the net present value of a heifer to her current market value (see figure 1).

Figure 1. Predicted bred heifer values



This tool was employed to examine a few scenarios that can reflect the additional value that can be realized from an AI bred heifer. First, using a recent long-term forecast developed by the Agricultural Markets and Policy (AMAP) group at the University of Missouri http://amap.missouri.edu/images/research/Aug2014AMAPLivestockUpdate.pdf, feeder cattle prices were entered into the tool. The projected feeder cattle prices decline over the period by nearly $0.50 per pound returning to levels in 2020 that are near the 2012 levels. Cow-calf costs are also important to the NPV calculation and are based on the same long-term forecast that generated the feeder cattle price estimates.

In taking the baseline case of the feeder cattle prices discussed in the previous paragraph and assuming the potential herd replacement successfully produces a calf every year for 9 years before the cow is ultimately culled suggests that a current bred heifer value of $3,022 would result in a NPV of zero. That is, a producer would be economically indifferent between selling the bred heifer at that price versus putting it in the herd for the next nine years.

The zero NPV outcome assumes there is zero risk in the cattle price outlook, cost outlook or the production of calves when in fact all of those carry significant risk in this type of calculation. Unfortunately, the risk associated with cattle prices and costs is difficult to mitigate over the long term. However, there are steps that can be taken to reduce the risk of losing a calf along the way through a focus on genetics that start with calving ease. To put the importance of producing a calf each year into perspective, taking the same NPV example above and assuming one calf was lost in year two of her productive life results in the zero NPV purchase price falling to $2,055 or a $967 decline.

This steep decline results from the fact that the second calf born in the string of nine is one of the most valuable given the cattle price projections and that losing dollars early in the investment is worse than losing a calf later in her productive life because of the effect of the discount rate. To provide some additional perspective, losing a calf in year 6 of her productive life results in the purchase prices declining to $2,466 or a decline of $556.

The above simple example begins to provide some framework to economically value an AI bred heifer relative to average bred heifers. The comparison makes the assumption that improved genetics from using an AI approach results in a bred heifer with an increased probability of successfully calving over her productive lifespan. The missing assessment is the degree to which calving percentage increases as a result of using a more predictable AI sire.

There may be additional risk reduction possibilities from an AI bred heifer. Beyond increasing the chance of successfully raising a calf, the value of the offspring when it is sold can also be increased with some genetic focus due to the increased productivity of the offspring and the quality of the beef when sold.

One way to examine this effect in context of the value of an AI bred heifer is to provide a premium to feeder cattle prices reflective of what is seen in the marketplace today. For example, the range in the 600 to 650 pound Missouri feeder cattle price suggests that top-end calves have obtained roughly a 10 percent premium relative to the average price over the past several years. Applying that 10 percent premium to feeder cattle price projections used in the calculator

example above suggests the purchase price that equates to a zero NPV is increased by $591 to $3,613.

These two simple examples can provide the framework to begin to economically value the effects of an AI bred heifer relative to a bred heifer where few specifics about the genetic background are known. It is instructive to examine real world data that provides some feedback on the different economic values of bred heifers depending on whether or not they were AI sired.

The Show-Me-Select™ (SMS) Heifer Program

The SMS program that was started in the mid-1990s at the University of Missouri by Dr. David Patterson provides a robust set of data on the selling prices of bred heifers enrolled in the SMS program. There have been 128 bred-heifer sales that sold over 27,000 bred heifers at a gross value in excess of $34 million. By segmenting the data depending on the type of bred heifer sold, the difference in selling prices provides another comparison relative to the NPV approach above.

All SMS bred heifers must meet minimum specific requirements to be eligible for the program that include service sire EPD requirements for maximum birth weight and minimum calving ease that depend on the breed. In addition, all sires used in conjunction with artificial insemination must have a minimum accuracy value of 0.6 on a scale of zero to one. There are other program requirements such as minimum vaccination requirements (see http://agebb.missouri.edu/select/prgmreq.htm for full program details).

The SMS program created another tier relative to the original program requirements, Tier 2, which added minimum accuracies for: calving ease (direct), calving ease (maternal), weaning weight, carcass weight and marbling.

In summarizing the sales data over the fall 2010 to spring 2014 sales period, interesting value differences emerge depending on the type or tier of bred heifer sold. For example, a Tier 1 natural service bred heifer sold for $1,702 over this period. A Tier 1 AI bred heifer fetched $1,978 over the period or an additional $276. The Tier 2 values also show added value relative to the Tier 1 natural service bred heifer value. A natural service Tier 2 bred heifer value averaged $1,934, a gain of $232 relative to a natural service Tier 1 bred heifer while a Tier 2 AI bred heifer added $407 to the sales price reaching $2,109.

Although somewhat anecdotal evidence, the $407 additional value obtained by a Tier 2 AI bred heifer over a Tier 1 natural service bred heifer is similar in magnitude to the value obtained from using the NPV approach discussed at the beginning of this article. These two alternative approaches to estimate the value of AI bred heifers begin to provide a range on the added value that is assigned in today's marketplace.

It is important to keep the SMS bred heifer values in perspective. The Tier 1 natural service bred heifer value of $1,702 exceeds the $1,314 average value of bred heifers sold at

Oklahoma City over the same time period, showing that the SMS program requirements add value to all heifers sold in the program.

University of Missouri Thompson Research Center Steer Values

The Thompson Research Center located near Spickard, Missouri has been using an AI program for a number of years. The breeding program led by Dr. David Patterson has focused on increasing the genetic potential of the herd from both the calving success side of the equation as well as a focus on additional traits such as marbling. This roughly 200 head beef cow operation has a set of females that look very consistent. An AI program has been in place for a long time at the Center.

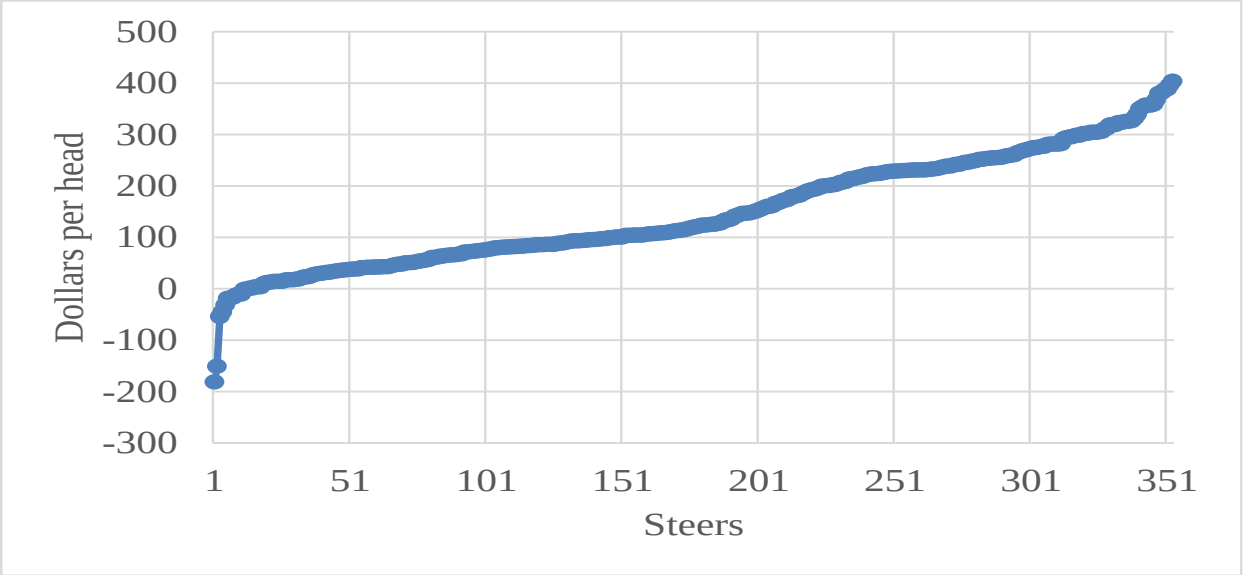
For the past several years, the steer calves have been fed in a western Kansas yard. Carcass data received back from the feed yard has been used to economically evaluate the effect of this focused breeding program. The results have been phenomenal in terms of the quality grade outcomes of each set of steers fed the last few years. However, more important is the measurement of economic opportunities from applying this breeding program. It is important to recognize that the Thompson Research Center steers have averaged between 25 and 30 percent prime without experiencing much if any discount from the yield grade side of the equation. That is amazing when one realizes the average percentage of prime in the country today is less than 5 percent.

This gathered data set provides a great way to evaluate the economic effect of the genetic gain these steers provided in the feed yard. The results show a consistent story that the Thompson Research Center steers had added value in the feed yard.

The calculations done for comparisons looked at how the steers would have sold as feeder animals the day they went to the feed yards relative to their value when slaughtered (see figure 2). The data provide by USDA-AMS on St. Joseph, Missouri feeder steer prices were used to value the steers. With multiple years of data available, the results include periods of time where both feed costs and cattle values moved significantly in both direction. These large moves allow for robustness in the results.

Some results jump off the page. First, not a single steer that graded prime was worth less at slaughter than when it was valued as a feeder animal the day it went to the feed yard. Of the 199 steers that were Certified Angus Beef qualified, only one steer did not show a value gain over the feeding period.

Figure 2. Economic returns from feeding Thompson Research Center steers versus selling as feeder cattle



The average value gain across approximately 350 steers fed over the 2008 to 2012 period was $148.37. This gain is the difference between their feed yard closeout and their calculated value at the time they went to the feed yard.

This does not suggest that cow-calf producers should get into the cattle feeding business because of the genetic gain that can be accomplished through proven genetics. However, it highlights the value addition shows that these feeder steers are worth more to cattle feeders. The added gain per steer shown here is very near the 10 percent increase in feeder cattle prices assumed in the NPV approach in the beginning.

Economic Gain Shown From Available Data

The summary of the data available from the SMS bred heifer sales and the Thompson Research Center steer feed outs show that the value of these heifers and steers increased as an AI breeding program was implemented.

In the case of the SMS bred heifers, a Tier 2 AI bred heifer was worth an additional $407 on average over a SMS Tier 1 natural service bred heifer. In the case of Thompson Research Center steers, they were worth an additional $148.37 per head relative to the average feeder cattle price they would have brought had they been sold as feeder cattle.

These economic gains generally follow the NPV approach that suggested a bred heifer is worth an additional $591 if her offspring garners a 10 percent premium in the marketplace. The economic value of a bred heifer successfully producing a calf every year of her reproductive life

is also large and similar to the distinction shown in sales of SMS AI bred heifers relative to natural service bred heifers.

The opportunity to grow the cattle herd lies ahead for the industry. The cattle industry has a chance to invest in better genetics that makes the cattle industry more competitive with the other meat sectors. This investment is likely critical for the cow-calf producers who will likely see lower economic returns 5 to 10 years down the road.

Using an AI program to increase the genetic advancement of producers' herds appears to provide a way to reduce the risk of increasing herds. Cattle producers can't reduce long-term cattle price risk but can use a reproductive program that includes the use of an AI program to increase the genetic potential of the herd which will increase the likelihood of a calf and result in cattle that grow efficiently and capture quality premiums available in the marketplace.