University of Nebraska Lincoln Beef Economics Team Annual Beef Heifer Replacement Forecasts for the 2018 – 2019 Production Season

Ranch profitability is not the result of a single choice but the culmination of all management, marketing and production choices. Therefore, better individual choices such as controlling costs are likely to result in increased profitability or decreased loss. Some choices have a larger role in affecting profits and sustainability. The costs of brood cow replacements are basic to profitability in beef operations.

Therefore, what is a reasonable amount to spend on beef replacement heifers for the coming 2018-2019 production season? Like many decisions, this may seem very complex or difficult to determine, and it can be since there are many factors. The intention of this report is to help stakeholders in two ways. First letting them see some "best guesses" forecasts, using some common sources of information, i.e. FAPRI, Nebraska Cow Calf Cost Cow-q-lator and Kansas State Beef cow budgets. Secondly to help those wishing to make their own forecasts. Readers are welcome to request a copy of the excel spreadsheet known as the Cow Price Forecasting Cow-Q-lator or CPFC and use it as the engine to drive their personal information for tailor made forecasts.

Regardless of the complexity and the challenges faced when making a good forecast or prediction of cow replacement values, it is nonetheless an important exercise. Paying for expensive animals without hope of future return seems ill conceived and an unwise use of precious capital, or foregoing purchases of added animals when more profitable. The concept behind making a reasonable forecast is really quite simple. Simple forecasts are limited to using available information. Furthermore, it is assumed that the forecast is based purely on a financial objective, the breakeven point. When a cow is purchased, the buyer is expecting that on average the cow's costs will be exceeded or met by her return. This then indicates that cows may be bought at prices that will never be recovered, while other purchased cows will pay enough to generate a breakeven status. With this in mind, it is clear on the type of information needed to forecast the current value of replacement cows. Factors significant in determining value include cow life (longevity), future productivity, future input/production costs, and expected future market values of the calf and cull cow.

Notably the replacement cow value is highly dependent on future unknown events. Since no forecast is any better than the accuracy of the information used to make it, and since that information itself must be forecast, great pains were taken to assure the use of the best available information. Only time will determine the accuracy and true value of the forecast. The information provided in this work is intended to be used with this thought in mind.

Generally, three primary factors need to be carefully considered when making a cow purchase decision:

1) The purchased/grown replacement cows ability to stay in the herd as a productive unit (longevity)
2) Current and future expected difference between costs and revenues (calf price and costs differences over the cows productive life)
3) Genetic compatibility with herd mates and operators goals and management style

Since it is difficult to anticipate and quantify all the possible conditions, types and choices that might occur in the future, five general cost scenarios and three herd types were used to create a total of fifteen forecasts. Factors left to be considered by buyers are related to other variables such as genetics and management style.

The CPFC model is simple in that it uses two primary factors that influence the value of a replacement beef female, revenues minus costs per calf weaned and the length of time (number of seasons) available to repay those costs. In the instance of weaned calf costs many factors contribute to this; pregnancy rates, overall feed costs, herd health programs, death rate, labor, insurance, equipment, facilities and so on.

The five different cow costs structures were identified on a per cow basis for the initial 2018/2019 calving season and then adjusted by the FAPRI index. The lowest cost was $600/hd, selected to determine the high mark for replacement cow value. Three Nebraska prices were, $621.94/hd for the Sandhills low costs pasture, $762.96/hd for Sandhills midrange costs pasture and $912.30 for Sandhills high costs pasture. The fifth costs was $685.07/hd and was taken directly from the FAPRI estimates. FAPRI had forecasted costs for each of the ten years listed in their report. The FAPRI costs were used to create an index to adjust the four other initial costs to the appropriate year in the model.

Revenues are based on FAPRI calf and cow forecasts for the next 10 seasons for March born calves. The productivity and animal information were derived from ranch records of the University of Nebraska Lincoln's Gudmundsen Sandhills Laboratory, GSL.

Capturing the longevity of any one, particular animal is a difficult proposition at best. Therefore, the idea that the current herd production performance is the best predictor of future performance was adopted for this model. Since longevity is key in valuing any particular animal a statistical model of life expectancy and productivity was created using the GSL data and three different expected cull rates. The lowest is a 14% cull rate with an average cow age of 5.88 years (older cows), the mid cull rate is 20% with cow age averaging 4.95 years (medium cows), the third cull rate is 28% with cow average age at 4 years (young cows).

Based on these herd ages and statistics, cows were randomly assigned an age at the time of leaving the herd at which time costs and revenues were tallied in order to estimate breakeven value and changes in current assets per cow. This was done 1000 times for each of the fifteen scenarios with all 1000 being recorded and averaged.

Under this premise, brood cows in the younger averaged herd would have a shorter production life whereas cows in an older averaged herd would on average have a longer production life. To provide uniformity for comparison of changes in asset value the beginning current asset was assigned at $1500/hd with the cow being valued at $870/hd leaving $630/hd cash on hand. This was done for all scenarios. This value provides a benchmark whereby impact on the ranch business can be seen in affecting current assets, cash and cow value.

Forecasts

For ease of discussion all forecast values reported in the text will be rounded to the nearest whole dollar value. The forecast are found in Table 1 and graphically Figure 1. Forecasts range from a low of -$623/hd to a high of $1009/hd). The lowest cost ($600/hd) and the lowest cull rate (14%) had the highest average breakeven value of $1009/hd. Best case scenario is where costs are lowest and herd average age is highest, the lowest annual replacement rate. From Figure 1 it can be seen that when cow costs are above the $685/hd/yr mark breakeven values become negative and reversed in the rank of the cull rate. For instance the $763/hd/yr group with the lowest cull rate having the lowest breakeven value. The same could be said of the $912/hd/yr cost group. This reversal is caused by the fact that longer-lived cows are losing profits for a longer period. Cows that hang around on average lose more dollars making there breakeven value less compared to shorter-lived animals. Remember that this model does not extend beyond the life of the individual cow and therefore neglects the cost of the replacement for the replacement which if considered would likely have opposite results on breakeven values.

Figure 1

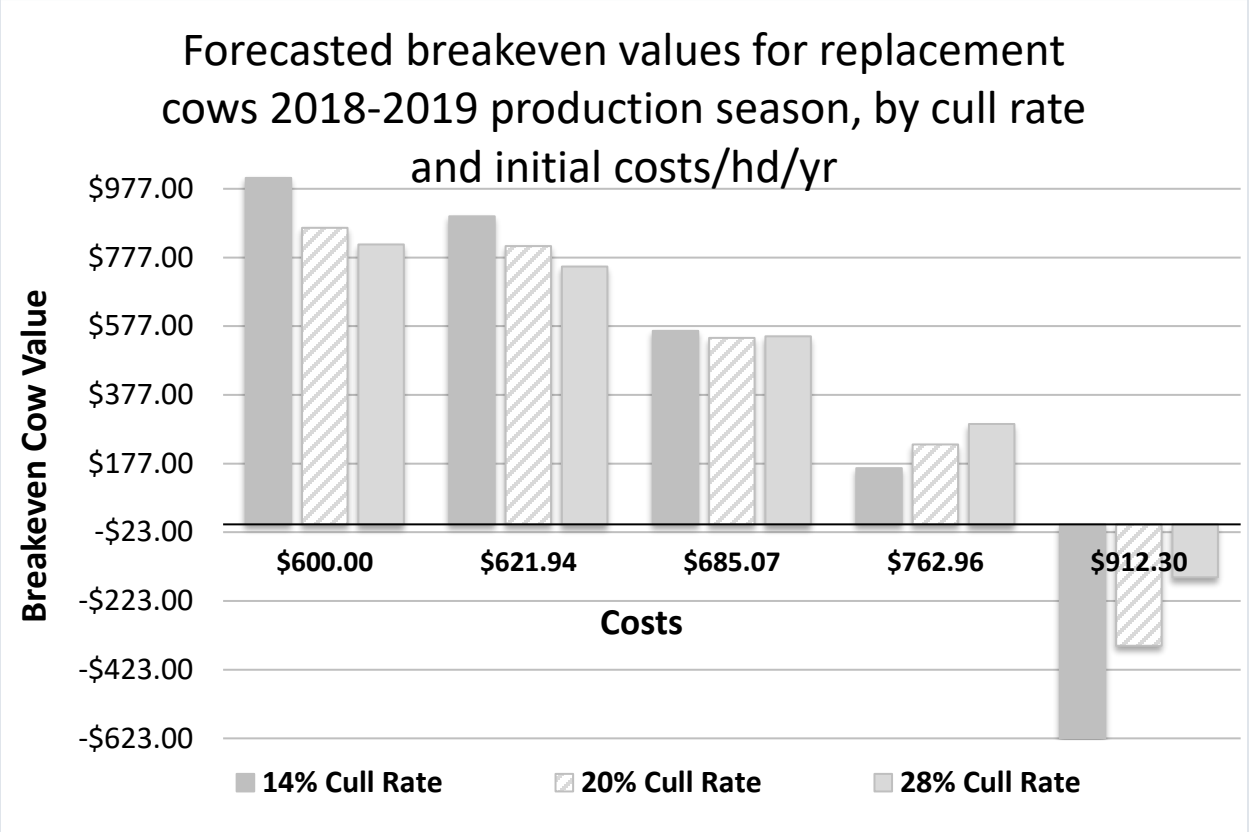

Table 1. Forecasted breakeven values for replacement cows (2018/2019) production season, by cull rate and initial costs/hd/yr

Beginning Costs/hd/Year	Annual Replacement Rate 14% Cull Rate	20% Cull Rate	28% Cull Rate
$ 600.00	$ 1,008.94	$ 863.32	$ 815.31
$ 621.94	$ 896.60	$ 809.99	$ 750.89
$ 685.07	$ 563.14	$ 542.82	$ 547.25
$ 762.96	$ 163.37	$ 232.61	$ 292.06
$ 912.30	$ -622.87	$ -353.84	$ -154.12

To better understand how changes in cull rate affects breakeven value of the replacement cows, look at Table 2. In the case where initial costs are $600/hd/yr between the 14% and 20% cull rates a 1% increase in the cull rate could be expected to decrease breakeven value of the replacement animals by an average of $24/hd. For the $622/hd/yr initial costs between the same two cull rates a 1%, increase in cull rate lowers cow replacement breakeven value by $14/hd. Finally, at the $685/hd/yr initial costs each 1% increase in the cull rate lowers the breakeven value by just more than $3/hd. The last two costs levels, $763/hd/yr and 912/hd/yr have negative values, which indicate that a 1% increase in the cull rate results in an added $12/hd and $45/hd increase to the breakeven in value. Rather than describe the effects of cull rate changes between the 20% and 28% rates they are interpreted as the 14% to 20%

changes. The potential changes of dollars cow replacement value for a 1% increase in cull rate at this higher level are smaller in magnitude as can be seen in Table 2.

This information can be used to extrapolate a replacement cow breakeven value for unlisted cull rates. For example if I was a low costs producer at approximately the $622/hd/yr and had a cull rate of 17% I could extrapolate a new breakeven value. First, calculate the difference between the 14% and the 17% cull rate, which is an increase of 3%, so 3 times $14 is equal to close to $43 so by subtracting this value from the $896/hd, the 14% replacement cow value, the new $853/hd is the new forecast for replacement cow breakeven value.

Table 2. Dollar decrease in cow replacement value for every 1% increase in cull rate

	Change in percentage points	
Costs	**6 points (14% - 20%)**	**8 points (20% - 28%)**
$600.00	$24.27	$6.00
$621.94	$14.43	$7.39
$685.07	$3.39	-$0.55
$762.96	-$11.54	-$7.43
$912.30	-$44.84	-$24.96

From the foregoing information, an average change in breakeven value by cull rate is calculated. The incremental values by cull rate are listed in Table 3. Given that a producer has a $622/hd/yr initial costs and 14% cull rate by reducing costs $10/hd/yr they could expect to increase the purchase ceiling for replacement cows from $897/hd to $948/hd. To go a step further what if that same producer has a higher cull rate such as 18%. They could simply multiply by 4, difference between the 14% and 18%, times the $14/hd decrease in breakeven value per 1% increase in cull rate (Table 2). This gets a product of $58, and subtract it from the $948/hd leaves you with a forecasted breakeven price for replacement costs of $890/hd.

Table 3. Average increase in replacement cow breakeven value for every $1 decrease in initial costs, by cull rate

	Annual Replacement Rate		
	14% Cull Rate	**20% Cull Rate**	**28% Cull Rate**
Average $	$5.20	$3.64	$3.11

Conclusion

As the costs of production per calf increases, the amount producers are able to pay for replacements decreases and vice versa. The breakeven values for cow replacements are more responsive for the low cost producers than they are for high cost producer. For instance, a 2% decrease (19% to 17%) in replacement rate at the $600 dollar cost is ($24.27 x 2) would allow you to pay $48.54 additional dollars for replacements. At the $912.30 cost a 2% decrease in replacement rate at the $912.30 dollar cost is (-$44.84 x 2) would allow you to pay -$89.68 additional dollars for replacements. Why this would allow you to pay less, is because the fewer the cows at this cost the less each cow loses. Note that there is a synergetic effect between cost structure and replacement rate, making production and cost choices very important to consider if not tricky. As longevity of cow replacements increase, average herd age increase, breakeven values also increase except in high cost scenario. Low cost low replacement herds are able to afford higher heifer replacement costs. The key to buying higher priced

profitable replacements is based on individual cost structure, and herd replacement rate. The primary effects of this work are driven by two factors 1) culling, which is generally driven by pregnancy rates and 2) annual cow production costs, primarily due to feeding (pasture, hay and supplementation costs). To afford higher replacement costs higher levels of cost control and increased productivity must be achieved. Increasing productivity while increasing costs has an unknown effect. The outcome is dependent on which factor (cost or replacement rate) is most dominate and which dominates depends on the degree which each changes. The electronic Excel spreadsheet that generated these results is available upon request to the authors. In addition there is a Cow Purchase Forecast Calculator that can be downloaded at Farmcents.unl.edu This calculator only requires inputs of cow costs and replacement rates. The primary information required to use this decision aide include 11 years consecutive years of annual cow cost, expected pregnancy rates, death rates weaning rates, price or value expectations for both calves sold and cull cows.