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**A Capital Investment Approach to Bred Heifer Valuation in an Expanding Cattle Market**

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# A Capital Investment Approach to Bred Heifer Valuation in an Expanding Cattle Market

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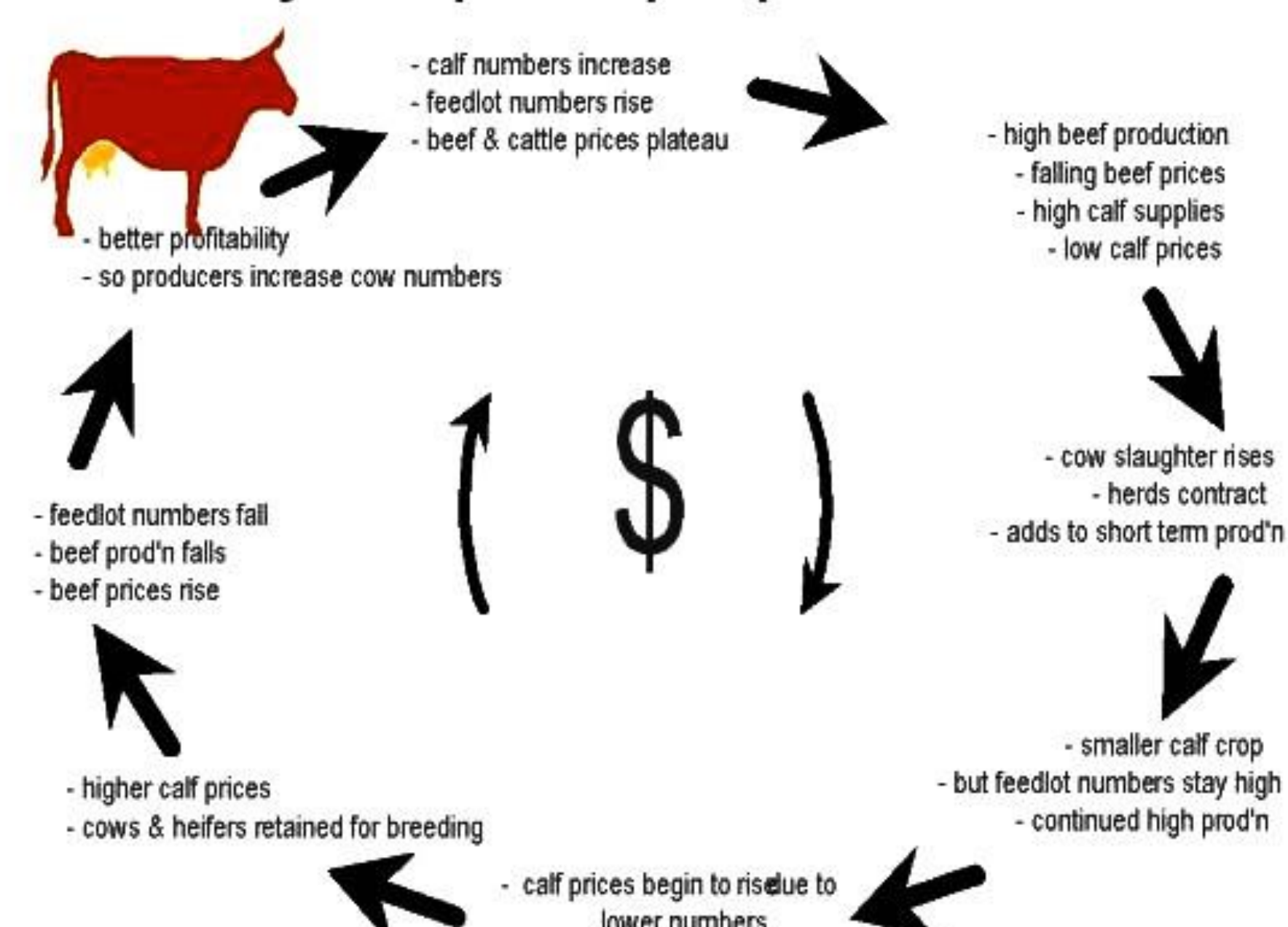


## Abstract:

Selecting replacement females in the cattle herd is a challenging economic decision for cattlemen. Producers have two options for replacing cull cows, purchase or raise the replacement heifers. Either approach requires a long-run planning horizon and is complicated by calf price volatility and uncertainty. The current situation is unique in that calf prices set records in 2014 and 2015, while beef cow numbers were at historically low levels. So, producers are not only considering heifer investments from a replacement perspective, but also from an expansion perspective. Some factors determine if that is the correct decision. Utilizing a capital investment model, the analysis will determine the conditions under which the expected return on their bred heifers purchased (or raised) will be reasonable in a high-priced environment. The data will include numerous variables such as genetics, the number of marketable calves, annual costs of maintenance, and discount rate. With net present value being involved, the outcome will analyze the investment in the present value of purchasing a replacement heifer over the production lifespan.

## Cattle Cycle:

US cattle cycle helps anticipate production trends



## Background:

- ◆ Kentucky is the largest cattle producing state east of the Mississippi River, currently managing over 1.1 million beef cows. For the 39,000 beef producers across the state, the total cash receipts recorded for 2014 was 1.04 billion dollars, a substantial increase from the \$825.4 million dollars received in 2013.
- ◆ Replacement of females into the herd is essential to any successful operation, but the methods by how the heifers become an addition to the herd vary between producer. It is recommended that 30 percent of the should be replaced annually.
- ◆ In 2010, feeder calf prices began increasing and reached a record high in 2015. "A year for the herd record books" is what some would describe the calf crop revenue received from \$240/cwt prices. High prices have been determined by a combination of strong consumer demand for beef and the tightest cattle inventory that the industry has experienced in seven to eight decades.

## Main Variable Table Used for Heifer Purchase Calculations

Weaning Weight	525	lbs		Cull Value	\$ 1,000
Weaning Rate	85%			Discount Rate	3%
Calf Sales Price	\$ 1.70			Heifer Purchase Cost	\$ 2,000.00
Useful Life	8	years		Heifer Maintenance Cost	\$ 85.14
				Cow maintenance	

## Main Variable Table Used for Retaining Heifer Calculations

Weaning Weight	525	lbs		Cull Value	\$ 1,000
Weaning Rate	85%			Discount Rate	3%
Calf Sales Price	\$ 1.70			Heifer Purchase Cost	\$ -
Useful Life	8	years		Heifer Maintenance Cost	\$ 85.14
				Cow maintenance	\$ 397.68

## Purchase Replacement Heifers

	NPV Per Cow	Max Pay Per Cow
3%	\$ 1,419.46	\$ 3,334.32
5%	\$ 1,200.11	\$ 3,114.97
7%	\$ 1,004.75	\$ 2,919.61
9%	\$ 830.06	\$ 2,744.92

Payback Period	5.54	years
IRR	13%	

## Retain Replacement Heifers

	NPV Per Cow	Max Pay Per Cow
3%	\$ 3,419.46	\$ 3,334.32
5%	\$ 3,218.60	\$ 3,133.46
7%	\$ 3,041.05	\$ 2,955.91
9%	\$ 2,883.50	\$ 2,798.36

Payback Period	2.20	years
IRR	92%	

## Results:

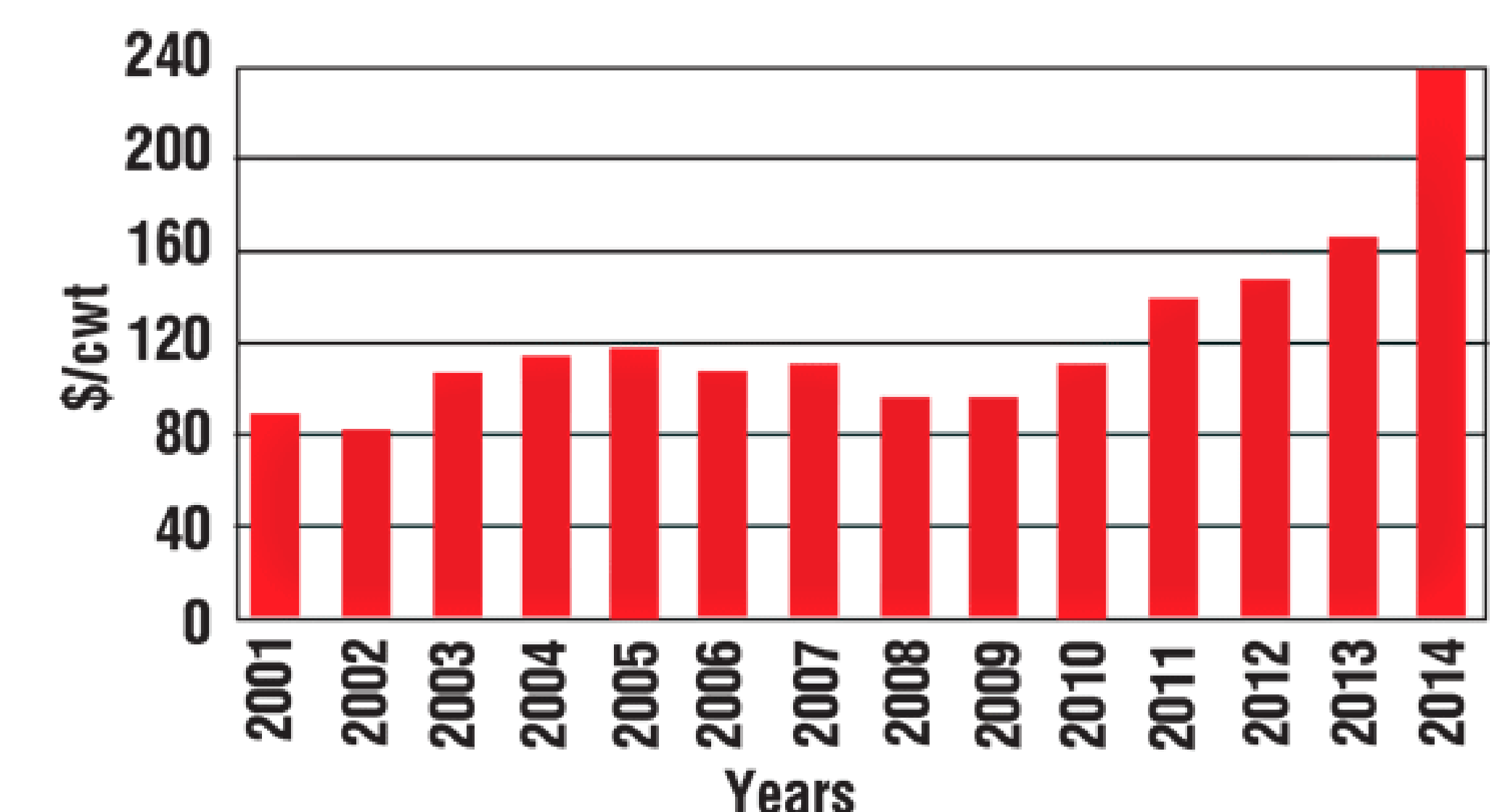
- ◆ Retaining replacement heifers are the method of expansion that holds the most economic opportunity for producers. By inputting prices reflected from 2014 and 2015, the opportunity and willingness to pay for replacement females drastically decreases as the rate increases. When purchasing replacement females cost producers too much when projected prices are too low, the result of what the farmer can afford to do is reflected in the payback period. The decision to retain heifers is an obvious choice for the producer from where the female start earning a return twice as fast.

## Objectives:

- ◆ Determined the Net Present Value (NPV) and a producer's maximum willingness-to-pay per cow at different rate levels. A high heifer purchase price was utilized to reflect the price environment experienced in recent years ensuring that the model would be realistic to current producer conditions.
  - NPV was determined by determining the Present Value of Benefits less cost at each given rate.
  - Maximum willingness-to-pay was calculated by summing heifer purchase cost and NPV less maintenance cost.

## Price Trends:

Figure 4. Annual mid-month average for feeder futures (2001-2014)



## Data and Methods:

- ◆ Data was derived from the Extension Budgets focused on beef cattle provided by the University of Kentucky Agriculture Economics Department.
  - Prices were used from 2014 for purchased heifer cost and calf sale price was the average price for five years.

### Heifer Maintenance Cost:

- Pasture
- Hay & Grain
- Salt & Mineral
- Vet & Medical
- Mach & Equipment
- Sum\*.25=3 months pre-calving

### Cow Maintenance Cost:

- Pasture
- Hay & Grain
- Salt & Mineral
- Vet, Medical, & Breeding
- Marketing
- Machinery & Equipment