Price Effects of Heifer Reproductive Tract Maturity Scores

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Introduction

Of all the factors affecting the economic performance, and therefore value, of breeding females, reproductive factors are the most important. Specifically, standard financial theory indicates that the value of a breeding female is the net present value of the cash flows she will generate over the course of her productive life, plus her cull value. While annual production costs are an important factor, reproductive factors determine the length of breeding females’ useful lives. This paper examines the value of Reproductive Tract Maturity Scoring (RTMS) in terms of its effect on the prices of bred heifers.

RTMS uses palpation to determine the reproductive maturity of young heifers. The system uses a 5-tiered scoring system. A score of 1 indicates pre-pubescence, 2 indicates peri-pubescence, 3 indicates pubescence, 4 indicates that the heifer is cycling, and 5 is similar to 4 except that a palpable corpus luteum is present. This score has been demonstrated to be a reliable indicator of reproductive maturity in heifers. Further, it is also a reliable indicator of long-term productivity. Pence, BreDahl, and Thomson (1999) note that

Heifers that mature early are capable of being bred earlier in a controlled breeding season and should wean a heavier calf. These heifers tend to breed early each breeding season for the rest of their reproductive lives and have lifetime heavier weaned-calf weights. With this economic value placed on reproduction, ways to measure and predict reproductive efficiency in cattle are needed.

RTMS is one such method. It has been demonstrated that RTMS is both repeatable and accurate (Rosenkrans and Hardin, 2003) and that it can generate economic value in a breeding program (Stevenson et al., 2008). However, it has yet to be determined whether buyers of replacement heifers consider RTMS a reliable indicator of future reproductive performance. This paper contributes to the existing literature on reproduction in beef cattle by answering this question.
**Model and Data**

We develop an empirical model based on a simplified net present value model of breeding heifer price. The capital value of a bred heifer is the net present discounted value of future cash flows. Specifically, the capital value is a function of the probability of weaning a market calf, the price and weight of each calf, the annual cost of feeding and maintaining the cow, and the cow’s cull value. Due to a lack of data, we ignore the cull value and the annual cost of feed and maintenance.

We assume an efficient market for heifers exists such that the observed price is equal to the capital value of the bred heifer. The breed type of the heifer (specifically, the breeds of her sire and dam) affects the expected prices and weights of her future market calves. The RTMS is a proxy for the future productivity of the bred heifer. Further, the number of days the heifer has been pregnant on the day of sale is also assumed to affect the future productivity of the bred heifer. Weight is also a factor, since it determines to some extent the size of the calves produced in the future. Thus, our model is specified as follows:

\[ \text{Price}_{it} = \alpha + \beta_1 \text{RTM}_{it} + \beta_2 \text{Days}_{it} + \beta_3 \text{Weight}_{it} + \beta_4 \text{Breed}_{it} + \beta_5 \text{Year}_t + \epsilon \]

where \( \text{Price}_{it} \) is the price of bred heifer \( i \) in year \( t \), \( \text{RTM}_{it} \) is the reproductive tract maturity score of bred heifer \( i \) in year \( t \), \( \text{Days}_{it} \) is the number of days heifer \( i \) in year \( t \) has been bred on the date of sale, \( \text{Weight}_{it} \) is the weight on the date of sale, \( \text{Breed}_{it} \) is the heifer’s breed type, and \( \text{Year}_t \) is a time trend.

Data are taken from the Heifer Evaluation and Reproductive Development (HERD) program at the University of Georgia. Data are collected over 6 years from 2010 to 2015 in Calhoun (northern GA) and Tifton (southern GA).

**References**
