# Comparison of Sire Carcass EPD Rankings Using Real-time Ultrasound Measures from Yearling Angus Bulls Versus Using Measures from Developing Angus Heifers

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**Summary**

**The purpose of this study was to compare how sires rank on EPD generated solely from yearling Angus bull measures against those generated solely from developing heifer measures. Ultrasound EPD from heifer progeny ultrasound measures are ranking the sires identically to the EPD from the bull progeny ultrasound measures. The heifer data complement the bull data, and breeders should be encouraged to scan all of their developing females at or around 390 days of age to improve the accuracy of carcass EPD based ultrasound measures.**

### Introduction

Iowa State University has just completed a two-year research project with the American Angus Association dealing with using real-time ultrasound to scan young seed stock animals for body composition traits. One of the primary objectives of this research project was to address the genetic aspects of ultrasound measured traits and to develop expected progeny differences (EPD) for carcass traits. The purpose of this study was to compare sires ranked on EPD generated solely from yearling Angus bull measures versus solely from developing heifer measures.

### Materials and Methods

There were 29,938 yearling bulls scanned during the period of January 1, 1998, through December 31, 1999, as a part of this research project. Bulls must be scanned within the age range of 320-440 days of age. During the same time there were 9,720 developing heifers scanned. Heifers must be scanned within the age range of 320-460 days of age. Measurements from the ultrasound image include 12-13$^{th}$ rib fat thickness (FAT), rump fat thickness (RFAT), ribeye area (REA) and percentage intramuscular fat (% IMF), the trait related to marbling. All of the ultrasound records are adjusted to age end points, 356-days for the bull measures and 390-days for the heifer measures. Weight at time of scanning is also collected and used in the multiple trait genetic prediction model. Weights were adjusted for age of dam effects. There is also a minor age of dam effect associated with % IMF; therefore the % IMF measures were additionally adjusted for age of dam effects. There were 2,094 sires with yearling bull progeny. There were 851 sires with developing heifer progeny. There were 623 sires that had both bull and heifer progeny. The product-moment ($r_p$) and Spearman rank ($r_s$) correlations were developed for these 623 sires having EPD from both sexes and are used to compare the EPD.

### Results and Discussions

The product-moment and Spearman-rank correlations between EPD for % IMF, REA, and FAT using yearling Angus bull ultrasound scan measures versus developing Angus heifer ultrasound scan measures are shown in Table 1. The general trend is for both types of correlations to improve (become more positive) as the level of EPD accuracy increases. Level of accuracy is primarily associated with the number of progeny that a sire has been evaluated on, in addition to trait heritability and how the progeny are distributed across different contemporary groups. The rank correlations are highest for the trait of % IMF, followed by ribeye area and then 12-13$^{th}$ rib fat thickness. The rank correlations are graphically represented by Figure 1. The drop in rank correlation at the accuracy level of .90 is most probably due to the fewer number of sires (14) represented.

The indication from Figure 1 is that as accuracy approaches .99, then the rank correlations for all traits are higher than .90, or at least, are closely approaching .90. This says that ultrasound EPD from heifer progeny ultrasound measures are ranking the sires identically to the EPD from the bull progeny ultrasound measures. This also says that the heifer data complement the bull data, and breeders should be encouraged to scan all of their developing females at or around 390 days of age to improve the accuracy of carcass EPD based ultrasound measures.

The relationship between required numbers of progeny (actual or effective number) to achieve a given level of accuracy for the % IMF trait in yearling Angus bulls and developing Angus heifers is shown in Figure 2. The accuracy, relative to numbers of progeny trend lines, is similar for the ribeye area and 12-13$^{th}$ rib fat thickness traits. An effective progeny number of 25 will give accuracy values of .70 for each of the ultrasound traits. In general, a total of 29 progeny are required to achieve the same level of accuracy. Note that effective progeny number takes into account the number of contemporary groups a sire has progeny in and the number or sires with which he is directly compared with. Effective progeny number is a more conservative number, and in all cases, will be smaller than the total number of progeny.

**Table 1. Product-moment ($r_p$) and Spearman rank ($r_s$) correlations between EPD for % IMF, REA, and FAT using yearling Angus bull ultrasound scan measures versus developing Angus heifer ultrasound scan measures.**

| | | % IMF | | REA | | FAT | |
|---|---|---|---|---|---|---|---|
| Level of Accuracy | No. of Sires | $r_p$ | $r_s$ | $r_p$ | $r_s$ | $r_p$ | $r_s$ |
| .60 | 135 | .75 | .72 | .58 | .56 | .46 | .40 |
| .65 | 103 | .79 | .74 | .64 | .60 | .51 | .47 |
| .70 | 81 | .82 | .79 | .68 | .63 | .53 | .47 |
| .75 | 50 | .85 | .83 | .69 | .64 | .63 | .56 |
| .80 | 33 | .87 | .83 | .76 | .75 | .68 | .62 |
| .85 | 31 | .92 | .88 | .79 | .75 | .72 | .70 |
| .90 | 14 | .80 | .80 | .87 | .70 | .68 | .66 |

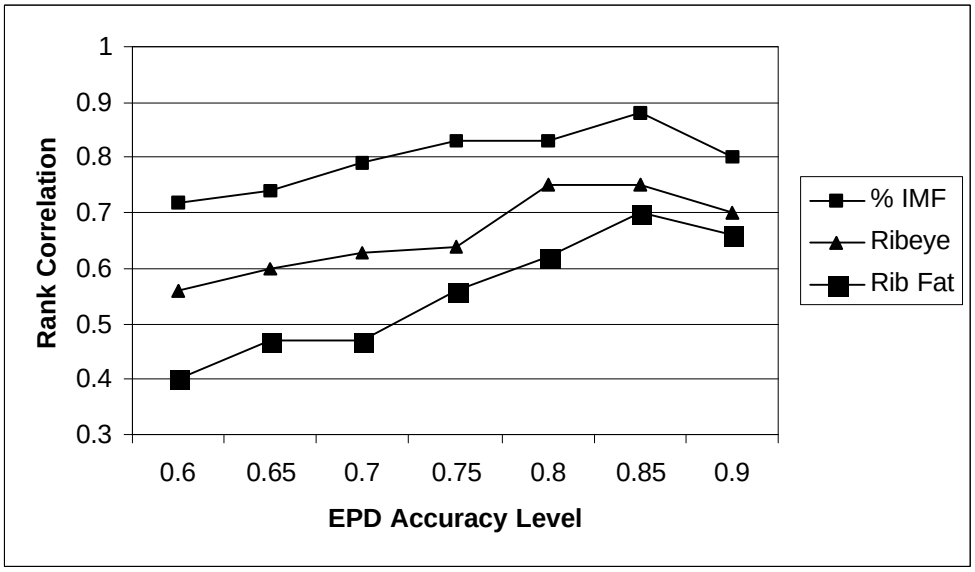


**Figure 1. Spearman rank ($r_s$) correlations between EPD for % IMF, REA, and FAT using yearling Angus bull ultrasound scan measures versus developing Angus heifer ultrasound scan measures.**

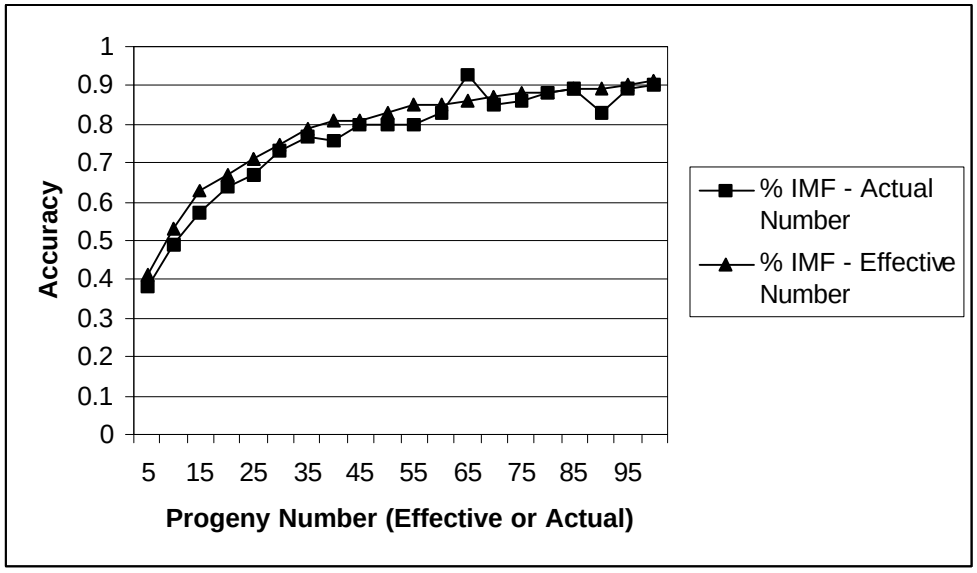


**Figure 2. Required numbers of progeny (actual or effective number) to achieve a given level of accuracy for the % IMF trait in yearling Angus bulls and developing Angus heifers.**

## Implications

**Angus breeders can use real-time ultrasound measures collected from developing heifers (320-460 days of age) as a supplement to scanning yearling bulls for the generation of ultrasound-based carcass EPD. Heifer scans will generally rank sires the same as bull scans, depending on the numbers of animals being scanned.**


### Acknowledgments

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