Beef Cattle Breeding Project Foundation Herd: Effect of Recipient Cow Age on Embryo Transfer Pregnancy Rates

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Introduction

A new beef cattle breeding project has been initiated at Iowa State University. The project has required a complete repopulation of the breeding herd. Part of the foundation cow herd has come from the purchase of virgin heifers in the fall of 1996; the remainder of the herd will come from an embryo transfer (ET) program that was conducted in the summer of 1997. The purpose of this report is to summarize some of the results of this program as they relate to recipient cow age and ET pregnancy rates.

Materials and Methods

Recipients for the ET program were heifers and cows left over from the previous and recently completed beef cattle breeding project. There were 81 Rhodes Research Farm spring-born 1996 heifers taken to the McNay Research Farm and commingled with the McNay heifers (89) to prepare them for the ET program. Mature cow recipients were kept at their respective farm of origin. In total, there were 170 heifers at McNay, 250 two-year-old and older cows at Rhodes, and 216 two-year-old and older cows at McNay prepared to serve as recipients. Iowa State University contracted with Trans Ova Genetics to help plan, coordinate, and perform the embryo transfers. The embryos came from three different Angus breeder sources. The majority of the embryos implanted were frozen; the balance were fresh. All females implanted with embryos were estrus synchronized according to procedures summarized in another research progress report. The transfers at Rhodes began June 18, 1997 and ran through July 8, 1997. The transfers at McNay began June 18, 1997 and ran through July 18, 1997. The recipients at Rhodes were checked for pregnancy using ultrasound on July 30, 1997. The recipients at McNay were hand palpated for pregnancy on August 20 and September 10, 1997.   Unknown pregnancy results for six embryos were deleted from the analysis in this paper.

The heifers at McNay were fed a high-moisture corn and haylage ration from weaning to breeding time with an objective of achieving a 5–6 body condition score. Two-year-old females were fed a corn silage ration through winter and then switched to a high-moisture corn and haylage ration during calving, also with an objective of achieving a 5–6 body condition score. The 3-year-old and older cows were fed corn silage through the winter and alfalfa-grass hay during calving, with a target body condition score of 5.0. There was at least a 60-day postpartum calving interval prior to start of the ET program.

A pregnancy result is categorical, being either pregnant (P) or open (O). Statistical significance tests of different effects on pregnancy results were accomplished using the PROC FREQ – CHISQ option of SAS (SAS User's Guide: Statistics, Ver. 5 Ed., 1985). These tests include both chi-square (χ^2) and likelihood ratio chi-square statistics.

Results

The overall pregnancy rates for the transferred embryos by recipient cow age are shown in a histogram in Figure 1. The trends clearly point out that the highest pregnancy rates were achieved with the virgin heifers (73.05%). Two-year-old and three-year-old cows had the worst pregnancy rates of 56.01 and 58.62%, respectively. Four-year-old cows and five-year-old and older cows had pregnancy rates of 66.07 and 68.84%, respectively. Pregnancy rates within each of the two research locations are presented in Figures 2 and 3.

Pregnancy rates as a function of yearling heifer source (Rhodes or McNay) are presented in Table 1. Differences between the pregnancy rates are statistically significant. The reason for the 12.04% pregnancy rate difference is not readily apparent.

Table 1. Pregnancy rates of yearling recipient heifers by research farm of origin.

Source/Pregnancy	Open	Pregnant	Total
McNay	23	80	103
	(22.33)[a]	(77.67)	
Rhodes	22	42	64
	(34.38)	(65.63)	
Total	45	122	167
	(26.95)	(73.05)	

Statistical Test	Probability
Chi-Square (χ^2)	.088
Likelihood ratio χ^2	.060

[a]Numbers in parentheses represent percentages.

Implications

The results from this embryo transfer project would suggest that virgin heifers and mature cows make the best recipients, assuming all else is equal in regard to cow condition, health status, and postpartum calving interval. A potential problem with using virgin heifers is the higher probability for more difficult calvings. Young cows (2- and 3-year-olds) are marginal recipient candidates because they generally are struggling to maintain adequate condition following calving and still growing significantly in body size.

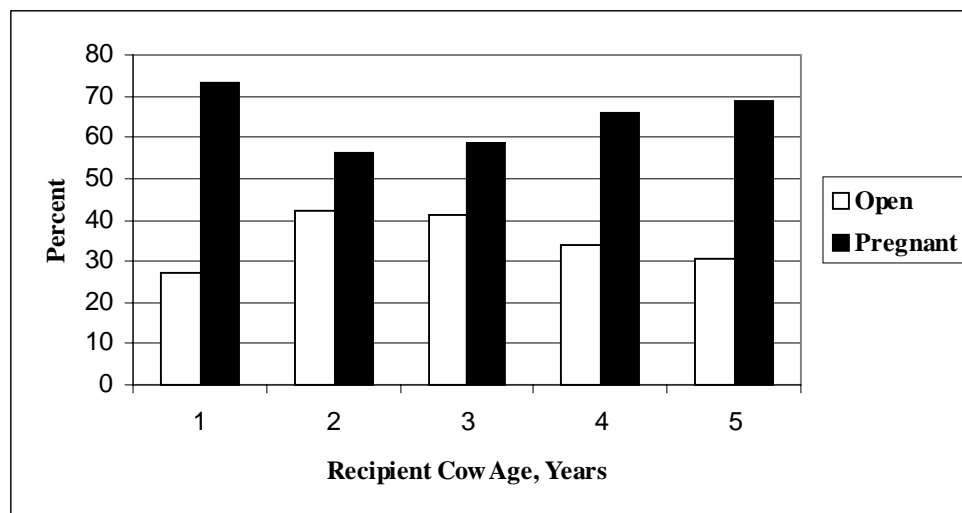**Figure 1. Pregnancy rates by cow across the two research farms.**

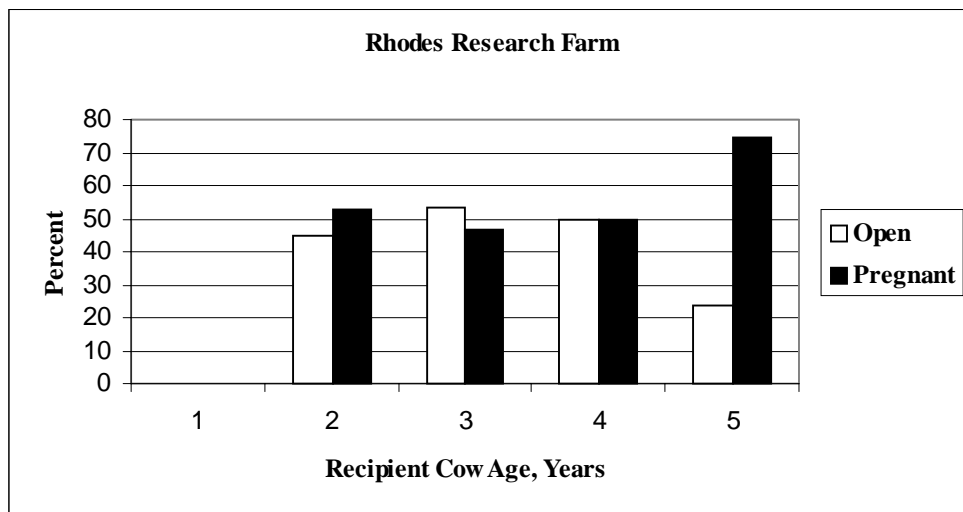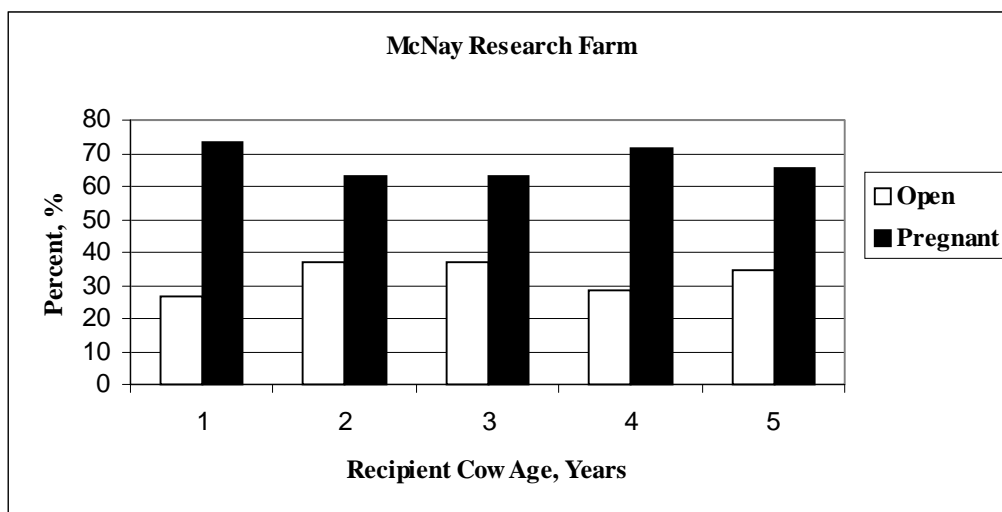**Figure 2. Embryo transfer pregnancy rate by recipient cow age at the Rhodes Research Farm.**

Figure 3. Embryo transfer pregnancy rate by recipient cow age at the McNay Research Farm.