

# Superovulation and embryo transfer in Wagyu donors and cross-bred recipients: A retrospective analysis of reproductive performance

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## Introduction

Embryo Transfer (ET) is a technology applied to accelerate the genetic progress of herds. Research on bovine ET has mainly focused on a few popular breeds, but the extrapolation of those results to less explored breeds might be questionable. The objective of this study was to determine the main factors associated with embryo production in Wagyu embryo donor cows and gestation performance in cross-bred embryo recipients through retrospective data analysis.

## Materials and Methods

The study included data from 410 superovulation (SOV) procedures performed at a farm located in central Florida and 486 ETs performed at 4 different locations within a 40-mile radius from the SOV site. For analysis of donor performance, the outcome of interest was Number of Viable Embryos per Flush. The model included the effects of Climate (Warm vs Cold, Temperature-Humidity Index threshold of 72), Year, Parity, Presence of a Suckling Calf, FSH Type and Company Performing the SOV. For analysis of recipient performance, the dependent variable was Pregnancy per ET. Models included the effects of Climate, Recipient's Location, Company Performing the ET, Type of Embryo (Fresh or Frozen), Quality of Embryo and Stage of Embryo Development. Embryo's quality and stage of development classifications were performed by experienced technicians according to the guidelines published by the International Embryo Transfer Society (IETS). Results were considered statistically different if *P*-values were equal or less than 0.05 and a tendency for statistical difference was considered when *P*-values were greater than 0.05 but equal or less than 0.10.

## Results

The Number of Viable Embryos per Flush produced by Wagyu donor cows did not differ with Climate (*P*=0.24) or Year (*P*=0.21). However, the Number of Viable Embryos per

Flush differed with parity (*P*=0.02; P0=4.2±1.2, P1=5.7±1.2, P2=6.9±1.2, P3=7.3±1.4 and P4=13.8±1.6), Presence of a suckling calf (*P*=0.02; Yes=8.2±1.2, No=6.1±1.2), FSH Type (*P*=0.02; DrugA=8.0±1.2, DrugB=6.1±1.2) and Company Performing the SOV (*P*=0.001; A=9.0±1.2, B=7.9±1.2, C=6.5±1.5, D=5.2±1.2). Pregnancy per ET in cross-bred recipient cows did not differ with any of the factors tested in the original model. Statistical outcomes were: Climate, *P*=0.18; Recipient's Location, *P*=0.61; Company Performing the ET, *P*=0.47; Type of Embryo, *P*=0.54; Quality of Embryo, *P*=0.39; and Stage of Embryo Development, *P*=0.63. However, when stepwise backward elimination was performed, after elimination of factors Stage of Embryo Development and Company Performing the ET, Climate tended to be statistically significant (*P*=0.09; Warm=43.7%, Cold=59.0%).

## Significance

The SOV and ET industry is characterized by the heterogeneity of protocols and techniques. Not surprisingly, results from the analysis of performance of donor cows indicate that type of drug used and company performing the SOV have a major effect on the harvest of viable embryos. Therefore, SOV/ET companies and farmers should rely on statistical methods to evaluate and improve their productivity. The significant effect of parity on donor performance must be interpreted with caution given a survival bias might exist because of culling practices. The positive effect of a suckling calf on donor performance was not anticipated, and might indicate that a period of "rest" between multiple SOV procedures might improve viable embryo yield. However, this speculated idea requires further investigation. The lack of statistically significant effects in the analysis of recipient performance might reflect the relatively small sample size for a binomial variable with narrow performance differences.