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Twinning in Cattle
Keith E. Gregory, Sherrill E. Echternkamp, Gordon E. Dickerson, Larry V. Cundiff, and Robert M. Koch

Introduction

Why an interest in twinning in cattle?
- More than one-half of the feed units used by the national beef herd are needed to meet maintenance requirements of the reproducing female population.
- The beef cow is capable of producing about .7 of her body weight per year in progeny market weight.
- The sow is capable of producing more than 8 times her body weight per year in progeny market weight.
- The meat type hen is capable of producing more than 70 times her body weight per year in progeny market weight.
- The channel catfish female is capable of producing more than 1,000 times her body weight per year in progeny market weight.

Why an interest in twinning in cattle? About 50 females/year with highest estimated breeding value (EBV) are superovulated (25 in May and 25 in September). Embryos are collected and transferred into recipient females with low EBV. The intent is to produce from 125 to 150 progeny/yr from high EBV cows mated to high EBV bulls.

Barring the identification of a gene with a major effect on twinning frequency, we do not expect much progress unless an effective selection criterion is identified that can be used at an early age. Therefore, starting at puberty, ovaries of all heifers are palpated per rectum to determine ovulation rate (number of corpora lutea) for 6 to 9 mo (8 to 12 estrous cycles) to produce replaceable females not bred to proven sires. Palpation of fall-born heifers starts in March and continues until October. Fall-born females are bred in their second spring and spring-born females are bred in their second fall.

Females are palpated per rectum to determine ovulation rate during the artificial insemination (AI) breeding season (spring and fall). Multiple ovulating cows are paired with contemporary single ovulating cows, and both are laparoscoped to validate rectal palpation results. It is important to know the relative effects of ovulation rate and embryonic loss on twinning frequency. Embryonic migration between uterine horns seldom occurs in cattle. Therefore, the effect of bilateral and unilateral multiple ovulations on embryonic loss and twinning frequency is of considerable interest. Spring and fall breeding seasons are about 60 days; 40 days are by AI and 20 days are by natural service in individual sire breeding pastures. Calves are weaned at the end of the AI breeding period.

Cows in the twinning project are weighed and scored for condition five times each yr; i.e., (a) before calving, (b) before breeding, (c) end of AI breeding period, (d) end of breeding season, and (e) when palpated for pregnancy. Height at hooks is taken at each period except at the end of the AI period.

Heifers are weighed at birth, weaning (about 100 days), and about 200 days of age. They are weighed, measured, and scored at about 12 mo. Pelvic area on males and females in the twinning project is measured at 11 to 12 mo of age. Libido evaluations are taken on spring born males retained for breeding but not on fall born males. Males are weighed at birth, at weaning (about 100 days), at about 200 days, and are weighed, measured (including scrotal circumference), and scored at about 1 yr of age. Thereafter, weights, measures (including scrotal circumference), and scores are taken two times each yr (May and September) as long as bulls remain in the herd.

About 15% of the females with highest EBV for twinning are paired with contemporary single ovulating cows. Matings are planned to limit the contribution of a single sire to 50% or less in any individual in early
generations and to 30% or less in the longer term. Breeds represented in the project are: (1) Holstein, (2) Simmental, (3) Charolais, (4) Brown Swiss, (5) Pinzgauer, (6) Gelbvieh, (7) Swedish Friesian, (8) Norwegian Red, (9) Shorthorn, (10) Hereford, and (11) Angus. Breeding (calving) occurs in both spring and fall.

Results

A total of 96 cows with records of two or more twin calvings were acquired from industry in 1976-77 (46), and in 1981-82 (50). Prior records averaged 3.83 parturitions per cow and 1.73 progeny per parturition. Subsequent records have averaged 2.47 parturitions per cow and 1.20 progeny per parturition. A total of 208 females with a record of twinning in other projects at the Research Center were transferred into the twinning project. Prior to transfer, these averaged 2.59 parturitions per cow and 1.39 progeny per parturition. Subsequently, they have averaged 2.92 parturitions and 1.15 progeny per parturition. Semen from three Swedish Friesian sires and two Norwegian Red sires whose daughters had produced twins at a high frequency was introduced in 1983 and 1984, respectively.

Parturition records (1,194) were analyzed for 578 females born in the project from 316 dams and 51 sires. In this population, mean twinning rate was 8%; estimated heritability was .06 from paternal half-sib correlations and .07 from maternal half-sib correlations. A total of 208 females with a record of twinning in the project have averaged 2.47 parturitions per cow and 1.20 progeny per parturition. A total of 208 females with a record of twinning in other projects at the Research Center were transferred into the twins project. Prior to transfer, these averaged 2.59 parturitions per cow and 1.39 progeny per parturition. Subsequently, they have averaged 2.92 parturitions and 1.15 progeny per parturition. Semen from three Swedish Friesian sires and two Norwegian Red sires whose daughters had produced twins at a high frequency was introduced in 1983 and 1984, respectively. Semen from three Swedish Friesian sires and two Norwegian Red sires whose daughters had produced twins at a high frequency was introduced in 1983 and 1984, respectively.

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