The objective of this research was to compare the combining ability of sires from 2 tropically adapted Bos Taurus breeds (Bos indicus) with 1 temperate Bos Taurus breed (Bos taurus) in Colombia. Twenty-eight breedings were recorded for a total of 139 boars, 14 bulls, and 90 sires. All breedings were monitored ultrasonically using a portable ultrasound machine (LMI, Agron DNA, Colombia) until 15 months of age to measure ultrasound traits. Statistical model for ultrasound traits contained all effects for growth traits plus a covariate for age of calf because ultrasound raw records were not adjusted for age. Sires were nested within breeds, and relationships among sires were accounted for. Thus, sire contemporary effects had means equal to their respective breed, and variance equal to ACY 2, where A = additive relationship matrix, and C = 1% = additive genetic variance, assumed to be the same for all breeds in this study. Residual effects were assumed to have mean zero, a variance equal to ACY 2, and be uncorrelated. Because ultrasound traits were FL, sire by sex effects were confounded with individual heterosis effect. Comparisons were carried out with the Mixed procedure of SAS (2009). Least squares means (LSM) for bull groups were compared with the Bonferroni multiple comparison test (Fisher, 1970).

Materials and methods

Animals. Thirty-seven bulls of nine breeds were randomly assigned to 110 350 kg Brahman cows and heifers. Bull breeds were: Brahman (BRO), Brahman × Holstein (BROH), Holstein × Brahman (HB), Holstein (Hol), red Angus × Brahman × Holstein (RAH), red Angus × Holstein (RAH), red Angus (RA), red Angus × Brahman × Holstein (RBH), and red Angus (RB). All animals were managed similarly throughout the study, except that cows were allocated to treatments using a fixed time ultrasonics protocol. Calves were born in 2008 and 2009. The number of sires per breed was 12 for GB, 6 for GB × BB, 6 for GB × RB, 5 for RB × Hol, 3 for BB × Hol and 5 for BB × RB. Table 1 shows the number of bulls per breed and the number of calves per breed group by year of birth and total.

Contemporary group effects were significant for all traits (P ≤ 0.001 to P ≤ 0.023), except for BM and BH. Least squares means (LSM) for BM and BH were similar across breed groups (DGG, 23.7 ± 2.2; MGG, 23.5 ± 2.2; BGG, 23.7 ± 2.2; GBG, 23.7 ± 2.2; GGG, 23.5 ± 2.2; P ≤ 0.05) and within groups at 12 months of age. The same trends were observed from BMs to RHG (23.7 ± 2.8; GBG, 23.7 ± 2.8; and GGG, 23.5 ± 2.8; P ≤ 0.05). When is not practical to provide for data on all genotypes because of the complex interactions among the variables included in the model. However, for all genotypes, the following conclusions can be drawn:

**CONCLUSIONS**

Sirelines with the best combining ability for growth traits and ultrasound and sires with breed effects useful for designing beef cattle breeding programs in Colombia.

**LITERATURE CITED**


The LSM for GB were similar across breed groups and calve ages suggesting that breed group of calf and contemporary group (bilinear interaction) was the best among all genotypes. For age of calf and residual effects. The LSMEANS for ultrasound traits contained all effects for growth traits plus a covariate for age of calf because ultrasound raw records were not adjusted for age. Sires were nested within breeds, and relationships among sires were accounted for. Thus, sire contemporary effects had means equal to their respective breed, and variance equal to ACY 2, where A = additive relationship matrix, and C = 1% = additive genetic variance, assumed to be the same for all breeds in this study. Residual effects were assumed to have mean zero, a variance equal to ACY 2, and be uncorrelated. Because ultrasound traits were FL, sire by sex effects were confounded with individual heterosis effect. Comparisons were carried out with the Mixed procedure of SAS (2009). Least squares means (LSM) for bull groups were compared with the Bonferroni multiple comparison test (Fisher, 1970).

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