

Colonial Spanish Horse Gait Study: New Findings

By Dr. Molly Nicodemus and Jeannette Beranger

The Wilbur-Cruce Mission horse is a strain of Colonial Spanish horse that is the last known remnant of historic Spanish Mission-type horses from Northern Mexico. These horses belonged to the Wilbur-Cruce family of Arizona. The original herd began with 25 mares and a stallion that were bought in 1885 from Juan Sepulveda, a horse trader from Northern Mexico. The horses originated in the northern Senora Desert region of Mexico, which is where the famous Father Kino's Jesuit missions were located. This region had been a source of high quality horses since around 1700. The original Wilbur-Cruce horses were kept as a closed strain, and over the years they adapted to the rugged terrain of the Arizona mountains.

Due to the breed's sure-footedness, it was assumed that the Wilbur-Cruce Mission horse's gait would be like that of other Colonial Spanish breeds of horses. An ongoing study led by Dr. Molly Nicodemus of Mississippi State University (MSU) has sought to determine the relationships between trotting velocities and the

Wilbur-Cruce Mission horse stride variables and whether at trotting velocities the Wilbur-Cruce Mission horse can perform a four-beat stepping gait like that of other gaited horse breeds. With the assistance of Wilbur-Cruce breeder and enthusiast Silke Schneider, nine Wilbur-Cruce Mission horses were videotaped working from the ground along the arena railing at both a slow (3.0 ± 0.3 m/s) and fast (4.7 ± 0.4 m/s) trotting velocity. Horses were filmed along the long side of the arena. Frame-by-frame analysis was performed documenting hoof contact and lift-off for ten strides for each horse at both velocities. MSU students used statistical testing for the study to determine gait symmetry and differences between stride variables at slow and fast velocities.

Stance durations (length of time each hoof is in contact with the ground) between left and right variables were found to be not significantly different, indicating the gaits analyzed were all symmetrical gaits like the walk and trot. At both velocities, the Wilbur-Cruce Mission horse alternated between periods of diagonal bipedal support (period where only the two

diagonal limbs are supporting the body during the stride) and suspension (period where no limbs are supporting the body during the stride), and thus, the gaits measured were all two-beat leaping gaits alternating between diagonal limb pairs (left hind limb and right forelimb or right hind limb and left forelimb), which is similar to the trot. At the fast velocity, significant changes were seen in the stride length and duration (length of time taken to complete one stride) and in limb support. However, stance durations, stride rate (number of strides

completed within one second), and diagonal advanced placement (length of time between hoof contacts of the diagonal limbs), and completion (length of time between hoof lift-offs of the diagonal limbs) remained consistent between velocities.

According to the variables measured, the findings indicate that when its speed is increased, the trot of the Wilbur-Cruce horse is different from other Colonial Spanish breeds. The Wilbur-Cruce is fairly similar in the variables measured with most other trotting breeds, but one variable that was slightly different was the slightly longer stance duration in comparison to other trotting breeds, and the lack of change in stance duration as the velocity increased. This may be due to the rough terrain found in the region the breed comes from, requiring the hoof to remain longer on the ground for more stability even when traveling at faster speeds. It is hard to say how significant a difference this may be, because there are not a lot of statistics comparing the gaits of various breeds, but it may be relevant.

As for the Wilbur-Cruce horse's mechanisms for increasing speed, they seem quite different from other trotting breeds. Studies done on European breeds and Standardbreds report a much larger increase in suspension, shortening of stance durations, and an increase in diagonal advanced placements and lift-offs causing a disassociation of diagonal limb pairs (i.e. creating a four-beat gait with suspension). This was not seen in the Wilbur-Cruce where the ability to keep hooves on the ground for longer periods and to move as diagonal pairs may help with increasing stability through rough terrain.

In comparison to the previous study conducted for the Marsh Tacky horse breed, the ability to be gaited (a four-beat gait with no pairing of limbs and no suspension) gives an advantage to the Marsh Tacky horses if they were to step in a soft area and sink. With this gait, they still have three other legs moving at different times that can assist in pulling that leg out. Coming down as diagonal pairs like the Wilbur-Cruce breed could cause the Marsh Tacky horse to sink more quickly in marshy areas.

While other Colonial Spanish breeds such as the Marsh Tacky and the Florida



The gait of the Wilbur-Cruce horse is likely specifically adapted to the rugged terrain where the breed has lived since the late 1800s. Photo by Marjorie Bender.

Cracker horse were found to perform four-beat stepping gaits at similar velocities, the Wilbur-Cruce Mission horse performed a trot at both velocities. Although similarities can be found between this study and other trotting studies, velocity changes for the Wilbur-Cruce Mission horse, unlike that of other trotting studies, did not impact stance durations or the ability to move in diagonal pairs as a true two-beat gait. Without statistical comparisons it is

hard to say how significant the different numbers found in the Wilbur-Cruce trot may be, making additional Colonial Spanish horse breed data vital to the understanding of locomotion within historically significant Colonial Spanish horse breeds. With fewer than 100 horses representing the Wilbur-Cruce horse breed, these stride variables can be applied in distinguishing the Wilbur-Cruce Mission horse from other Colonial Spanish breeds and assist in

further breed development. ❖

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Dr. Molly Nicodemus is an Associate Professor of Equine Sciences at Mississippi State University. Her research focus is equine biomechanics and she specializes in the gaits of the performance horse, including gaited horse breeds.

Spanish Goat Rescue Update

By Jeannette Beranger

ALBC is continuing the effort to remove portions of a threatened population of feral Spanish goats from an island just south of Charleston, South Carolina. This genetically important group has recently become threatened due to the encroachment of feral hogs in the area that compete with the goats for food resources on the island. After obtaining permission from the island owner, ALBC worked with local residents to capture and relocate some of the goats. The goal was to establish an off-island breeding group to ensure the security of this genetically significant bloodline. The first capture occurred in early spring 2010 when four goats were successfully removed and a new herd was established at the zoo facility at Brookgreen Gardens near Myrtle Beach, South Carolina.

In October 2010, with the summer heat



George Carden feeding Spanish goat, Sis. Photo by Jeannette Beranger.

gone and the local alligators and poisonous snakes safely in hibernation for the season, ALBC returned to the island to remove a second group of goats. Two does and a buck were captured on this trip.

ALBC member Gra Moore volunteered to help with the capture and transport. He joined ALBC staff member Jeannette Beranger in helping to take the goats off the island and to their new home. After a three-hour trip, the much anticipated new arrivals were greeted by their eager keepers and "old friends" in the wooded, seven-

acre pen they would be calling home. After several mild head butts between dominant does as the goats were reunited, the herd settled into eating the fresh hay as if nothing had happened.

More new additions joined the Brookgreen herd as the zoo welcomed the birth of the first kids born off-island just several days after the second group arrived. The new buckling and two doelings bring the total off-island population to ten. The zoo hopes that with the new addition of an adult buck, spring will bring more babies! All of the goats will remain at Brookgreen, and as the herd grows, breeding stock will be made available to conservation breeders needing additional genetic diversity. This population represents one of the few remaining Southeastern strains of Spanish goats.

A big thanks goes to George Carden, his daughter, Tina, and Gra Moore for volunteering their time and goat wrangling skills to help this project. ❖

For more information, email jberanger@albc-usa.com or call (919) 542-5704.



Volunteer Gra Moore helping blindfold goats for transfer. The blindfolds helped keep the animals calm and relaxed during the three-hour transport. Photo by Jeannette Beranger.