HED: Reminiscing on Idaho's World-Class First, nearly twenty years on...

Project Idaho started with a dare: American Mule Racing Association President Don Jacklin approached Gordon Woods, the founder of University of Idaho's Northwest Equine Reproduction Laboratory, with the goal of giving Idaho a "world's first."

That dare resulted in the birth of Idaho Gem, a mule cloned from a full brother of one of Jacklin's champion racers. That racer, Taz, was a world champion mule in as a three year old, four year old, and overall. He was the only race mule to become world champion in all three categories.

Woods worked with Dirk Vanderwall, who was recruited to UI to participate in the project, and a team from Utah State University from 1999 to 2009 to produce the clone. The UI team, consisting of Woods and Vanderwall, focused on equine reproduction, while the USU team, consisting of Ken White and Tom Bunch, focused on the cloning process. Both teams were assisted by a slew of graduate and undergraduate students.

"We could not have been successful with the mule cloning project by ourselves," Vanderwall said. "And I can say confidently that the same was true for Dr. White and his team with mule cloning."

The Idaho team managed a herd of over 100 mares, or female horses, most of which were egg donors for the cloning process. In addition to ensuring all the mares were in prime health for breeding, the Idaho team would ensure the mares went into heat at around the same time so their eggs could be collected at around the same time for the Utah team.

The Utah team would visit the project site – the Holme Research Center on the far west end of UI's Moscow campus – in one-week stints. During those sessions, the Idaho team would collect eggs from donor mares and give them to the Utah team, which would begin the cloning process in the lab.

Project Idaho used a process called nuclear transfer for the cloning process. The Utah team would remove the genetic information from the nucleus of the mare's egg cell and replace it with the genetic information from the donor mule cell, Vanderwall said.

Taz, the champion racer, couldn't be cloned directly. To have the best chance of producing a clone, the researchers needed to use donor tissue as close to reproductive tissue as possible. For Project Idaho, the researchers used fetal skin cells from Taz's full brother.

After replacing the genetic material, the Utah team would mimic the effects of fertilization through something called in vitro activation. This means the team would chemically induce the embryo – the egg with the mule cell's genetic information inside it – to begin developing.

Within hours of when the egg was first removed, Vanderwall would be given the embryo to surgically transfer into the recipient mare. From there, nature would take over. The mares would either become pregnant or they wouldn't.

Four years from the start of the project, Idaho Gem was born. Later that month, a team in Italy announced the birth of the first cloned horse. Idaho Gem's siblings – Utah Pioneer and Idaho Star – were the third and fourth cloned equines in the world.

"Each new species that was cloned after Dolly (a cloned sheep) would make scientific headlines, popular press headlines, and that was certainly true with the cloning of Idaho Gem and his siblings," Vanderwall said.

Idaho Gem, Utah Pioneer, and Idaho Star became scientific ambassadors after their births. This is when Jacklin took over.

Each mule was sent to a different state – one to New Mexico, one to California, one to elsewhere in Idaho – where each was subjected to different feeding routines, veterinary care, temperatures, and training regimens to prepare them for racing. The siblings met again at the Winnemucca Mule Race in June 2006, where Idaho Gem placed third.

"Everyone wanted to see him because he was the first equine clone in the world," Jacklin said. "He brought out record crowds at the Winnemucca race meets when we had him there, he brought out record crowds in the California race meets we had there."

While all three mules had great racing characteristics – a quarter horse-like blocky build rich in the muscles needed for short sprints – none of the clones qualified for top grade races. Jacklin had wanted to informally test the influence of genetic predisposition to racing against environmental factors. He came to the conclusion that about 70% of racing success was related to each mule's environment, while about 30% was

genetic.

While Jacklin's estimated numbers may not be exact, his instinct was right. Robert Collier, UI's current department head of Animal, Veterinary and Food Sciences, said the genetic heritability of racing success is notoriously low. Collier was focused on cattle and sheep at University of Arizona at the time Project Idaho was active. He joined UI's faculty in 2019, about 10 years after the end of the project.

NWERL, the equine lab, shut down after Woods left UI in 2007. The Holmes Center, where the cloning took place, is now used by a team looking into the health of newborn piglets, Collier said. The building is also shared with the USDA, according to Associate Professor Brenda Murdoch, but there is no equine program or mammalian cloning at UI.

The university still teaches some equine courses, primarily through Senior Instructor Stacey Doumit, Collier said. Horses on campus are primarily owned either by people in the cattle or equine teaching programs or by the horse polo club, Murdoch said.

Despite the loss of equine programs on campus, the AVS program still appreciates the impact of Project Idaho on its notoriety.

"Sometimes it takes things like this to bring recognition to the hard work that professors are doing here every day," Murdoch said. "Sometimes that hard work goes unrecognized, but in this case, this delivery and the efforts within CALS (the College of Agricultural and Life Sciences) and the support of the department to be recognized on a much larger scale."

Woods passed away in 2014, at the age of 57. At the time, he'd been using his experience with the cloning project to research cancer and age-onset diseases in humans at Colorado State University.

Vanderwall now serves as the department head of horse reproduction at Utah State University. Instead of focusing on cloning, he's working on a new method to keep performance mares, like those which participate in racing or shows, out of heat.

Jacklin still breeds racing mules, but his daughters, Laurice and Gayle, are beginning to take over the family business. He looks forward to watching another cloned mule – Little Sarah, a clone of a mare named Sarah – race in Bishop, California the last week of May.

As for the mules? All three are alive and well. Utah Pioneer and Idaho Star are in Idaho, and have changed hands numerous times. Idaho Gem now belongs to Jacklin's trainer's niece, and lives in California.