

My Favorite Mule is a Hinny!

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Why a hinny?

Have you ever seen or owned a mule that just seemed a little more like a horse or maybe a little more like a donkey or only associated with donkeys in the pasture? Maybe the hybrid was not a mule instead it was a hinny. I have always been intrigued with hinnys. I almost bought a beautiful chestnut hinny with a star on his forehead in Houston, TX one year from Dianne Mangrum. The hinny was very horse like and quite fancy. Needless, to say my father would not allow me to buy a hinny. It is my theory that there are more hinnys around than we realize.

When trying to raise hinnys versus mules claims have been made that it is more challenging to get a jenny to conceive when being bred to a stallion. According to Dr. David Pugh, a well renowned mule and donkey veterinarian at Auburn University, "when breeding a stallion to a jenny, which produces a hinny, the conception rate is quite low, only about 20%." I have had other conversations with industry experts such as, Dr. Tex Taylor, a retired veterinarianary surgeon from Texas A&M University, who has maintained his own private mammoth donkey research herd for decades. He has suggested that the decreased conception rate is actually due to problems associated with an outer protein covering on the stallion's sperm cells commonly referred to as the acrosome. It is possible that the acrosome can not penetrate the outer covering of the jenny's ovum called the zona pellucida. The outer membrane layer of the ovum (egg) or zona pellucida is made up of carbohydrate glycoprotein receptors and if the proteins are not compatible among the two species, fertilization may not be able to take place. Therefore, it is possible that the receptors can not or do not likely bind to the stallion spermatozoa.

Typically, the acrosome acts as an enzyme and breaks down the zona pellucida by drilling into the outer shell. In order to better understand why or why not the acrosome of the stallion maybe different from that of the jack I spoke with a reproduction specialist. Ms. Angela Maschari-Busta, a reproduction specialist at Michigan State University, provided me with more information about proteins found on the head of the sperm cells as well as a better understanding of what happens to sperm cells in the process of fertilization. She has worked exclusively for years with bovine sperm cells, specifically sexed semen (mostly all female cells) and has suggested to me that it's possible that the head of the sperm which is covered in proteins are species specific. Furthermore, the intrauterine environment according to Angela could also have a negative impact on the stallion's spermatazoa viability. Typically the sperm cells attach to the oviductal epithelium cells found in the lining of the uterine tubal(s). This process is mediated by glycoproteins found on the spermatozoa's head especially galactose-binding proteins (Sabour, 2006). Researchers have noted that the carbohydrates vary among animal species but the adhesion of equine spermatozoa binding to oviductal epithelium is carbohydrate dependent (DeMott, 1995). At this point the spermatozoa restore their energy by absorbing nutrients such as carbohydrates (needed for binding to the epithelium) or calcium (Dobrinski, 1996).



Walter Nunn and "LeMoan" participating in a cow working class at Bishop Mule Days in Bishop, California

If the jenny's intrauterine environment for example is higher or lower in carbohydrates or calcium this could create a hostile environment for the stallion's spermatozoa and could cause the cells to either (1) die or (2) be motile but not fertile. In mares galactosyl residues are responsible for binding to the stallions spermatozoa in the epithelium but what about in the jenny is it the same residue (Ball, 1997). If the ligand binding residue is different then it is likely that the stallion's sperm cell could die. To make matters even more interesting, some research has been dedicated to comparing a protein known as zonadhesin, glycoprotein found on equine spermatozoa. Among all three equine species, zebra, donkey and horse, this particular protein has been reported to be the same (Breazeale, 2002). Other reasons on why the conception rate is so much lower could be related to sperm-zona interactions which are also believed to be mediated by carbohydrate recognition (Yanagimachi, 1994).

According to Ms. Maschari, each mammalian species varies in the type of protein found on the head of the sperm or outer shell of the female's ovum. So, the theory of why conception rates are lower when producing hinnys may simply be due to species specific related issues. Until more research is done one can only assume why the conception rate is typically thought to be lower. Although there are hinnys found throughout the world but just how many? Of course I'm sure you are wondering how we can produce mules if the proteins or receptors are not compatible. Great question and this is my assumption that the reserve cross, the jack sperm cells are more adaptable and have less problems binding to the receptor and penetrating the zona as well as possibly be able to adapt and live in the oviduct epithelium of the mare. Before we go any further I would like to know how many people breed for hinnys each year. I would love to get some feedback and have a better idea!

There are many different ideas and beliefs related to producing hinnys. Some fallacies and myths about hinnys include ideas such as, "the hinny is not physically sound when compared to mules, and hinnys often have internal problems such as, organs that are not developed." Unfortunately, our industry is lacking in scientific research in the area of hinnys and mules and many of these questions or beliefs can not be answered or disputed. I did have a rare chance a few months ago to help with a hinny foal. Back in February, I had visited the Turning Point Donkey Rescue in Dansville, Michigan and met Ms. Sharon Windsor in sub-degree temperature! It was so cold that the diesel had frozen in the truck that day! Anyway, it did not stop me from visiting the farm and seeing the donkeys. A few weeks later Ms. Windsor called to ask me "how do you imprint a hinny foal?" I told her I assumed it would be like imprinting a donkey or mule foal but I had never seen a baby hinny in my twenty plus years of mules and donkey babies. About an hour later, I received another call from her and the foal was not nursing so I made another visit to the farm. The foal like Ms. Windsor said, "She was the funniest looking donkey foal she had ever seen." We both concluded the foal was a hinny based on its physical appearance.

The foal was a bright red sorrel and cute as a button to say the least but the jenny was not thrilled about the foal nursing. It made me wonder if the jenny was not accepting the foal because it was a hybrid and not a donkey. After an army of volunteers and Dr. Colby (the vet on call) trying to get the foal to nurse on its own and that didn't work the jenny was milked. The foal was fed colostrum from a frozen source as well as colostrum that were milked straight from the jenny but throughout the day the condition of the foal deteriorated. Later that evening we (Sharon and I) took the foal and jenny to the Michigan State University Veterinary Teaching Hospital. By that point, the donkey mom, Curly, had become quite attached to her baby. The foal rode the whole way in my lap in the cab of the truck so we could keep her warm.

Unfortunately, once arriving at the vet school hospital, there were some difficulties in passing a feeding tube and it took 2 and half hours before the foal received plasma and she passed away later that night. There are some anatomical differences in donkeys, mules, and hinnys, when compared to horses that makes it more difficult to some times pass a tube or even collect blood from the jugular. In 2002 at the American Association Equine Practitioners Annual Meeting, several seminars were dedicated to mules and donkeys and how to treat them. If you email me I can provide you with copies of the articles if you are interested in receiving them and sharing with your vet(s). The proceedings include great diagrams and descriptions on many of the anatomical differences such as laryngeal anatomy which is obviously somewhat different than that of a horse because donkeys don't whinny, they bray!

After the foal died I felt that it was very important to find out why this foal had died. I couldn't help but wonder if some of the myths about hinnys were true such as the tales I had heard about their internal organs not being developed properly. Considering that the foal was a hinny to our belief, I thought this was a somewhat rare and unique opportunity to learn from the first hinny foal I had ever seen in 20 plus years! The foal was submitted and taken to necropsy by Dr. Carla Carleton, an endocrinologist at MSU's vet school, who has an interest in mules and donkey and is serving on my graduate committee. Once the foal was submitted to necropsy, Dr. Dalen Agnew, was the pathologist assigned to the case and he did an outstanding job and really cared about why this mysterious animal passed away.

Are hinnys different than mules?

The preliminary report indicated the foal was stressed and the lungs were bright red, there was a possibility the foal had passed away from equine herpes virus infection or septicemia. There was some evidence that the foal was stressed and possibly the jenny had an intrauterine infection. Curly, the jenny was later cultured and was cultured clean (no infection was found). One finding in the preliminary report which was interesting was a tubular structure attached to the broad ligament. This structure created a lot of conversation among many professionals in regards to what it was and was the foal possibly a hermaphrodite. The final necropsy report showed the additional tubular structure to be an enlarged blood vessel that is larger in size when compared to a horse. It's possible that the larger blood vessel is normal in desert creatures like donkeys, mules, and hinnys. The report indicated that the foal most likely died from lack of nutrition and not due to an abnormal organ. Another very interesting event associated with the foal was the results of the karotyping.

This was a procedure I had not requested because after years of foaling out mares and jennys, I felt my experience was sufficient to identify the foal as being a hinny and never once did I think otherwise. The same was true for Sharon Windsor in both of our minds the foal was not a donkey but a hinny. When the foal was submitted to necropsy blood was taken from the foal to genetically identify the species. For whatever reason the blood was not properly stored in the correct medium to verify its genetic make-up but some how and this is where the necropsy results become some what fuzzy to me, a sample of blood or cells were taken and used to karotype the foal. According to Dr. Agnew, the pathologist in charge, when karotyping animals typically ten blood samples are taken for karotyping and the results are 75% accurate, however, the blood was not preserved properly but somehow the karotyping was still done by an expert in pediatrics genetics.



Hinny or donkey foal?

Only 62 chromosomes were counted from this obscure sample indicating the foal was not a hinny but actually a donkey. I'm still not convinced the foal was a donkey due to its physical appearance and more blood samples from known hinnys, mules, and donkeys are in the process of being taken and submitted for karyotyping. Also, when reviewing the photos and slides of the foal I had the chance to look at the ovarian tissue of this animal. There was no follicular activity meaning no follicles were present and follicular growth was occurring to produce eggs (ovums) for reproduction. However, typically sterile animals do not reproduce so is this unusual in a hinny or mule to lack follicles? Again, some mules and hinnys in China and Africa (Morocco, Ethiopia, and Kenya) have reported mules and hinnys that have produced foals but would more mules and hinnys have foals if they were bred? When compared to horse foals (fillies) multiple follicular growth could be identified in the tissue. This leads me to believe the animal along with its phenotypical characteristics was a hinny. A sterile animal such as a hinny or mule can produce ovums and sperm cells but not all of them due to complications with genes pairing with one another. Although, maybe this is typical in a jenny foal to lack follicular growth in her ovarian tissue, or maybe this is typical of mule and hinnys, we don't know because there were no other samples to compare the tissue to. Also, this brings up the question about how many hinnys have been karyotyped to compare to and some of the journal articles I have read and reviewed just suggested that typically a mule or hinny has 63 but who really knows because how many mules and hinnys have been tested? So, you can be the judge look at the photos and make up your own mind. Hinny or donkey foal?

Donkeys have 31 pairs of chromosomes or 62 in total. Typically, mules and hinnys have 63 chromosomes, they inherit 31 chromosomes from the donkey (*E. asinus*) and 32 from the horse (*E. caballus*) (Trujillo). After reading several scientific articles I am not 100% convinced that all hybrids contain 63 chromosomes and maybe more research needs to be done. Most of the reports I have read in regards to hinnys and mules are the rare cases where both have produced offspring. Even more interesting one article found that an intact male hinny contained both horse and donkey sperm cells in regards to chromosome counts (i.e. some contained 62 chromosomes and others contained 64 but none contained 63 chromosomes) (Trujillo). The mystery continues!

My favorite hinny!

It is my belief that there are more hinnys in the mule world than we realize because we typically group hinnys and mules together at shows. I often wonder how many times hinnys are sold as mules and the buyer is not told in fear they will not buy the animal. We bought our first hinny a year or two ago and when purchasing the hinny, which we believed to be a mule, the seller told us before paying for him that the mule was a hinny and did we still want to buy him. The seller informed us who raised the hinny and that he was by a Rocky Mountain Saddle Horse and by a mammoth jenny. We still purchased him and he's been a very unique and wonderful hinny. James Dean like several of the hinnys I have seen has a bald face. Of the few hinnys I have seen all have had some type of unusual star or markings that seem to be less common in mules.



James Dean



Amy McLean riding James Dean

Due to the fact that many people do not register their mules and animals change hands, and information is lost along the way, there are probably more hinnys around than we think. For example, twelve years ago I met a legendary mule trainer, who I consider to be one of my heroes, Walter Nunn, from Bryan, TX in Bishop, CA. He was riding a palomino mule, named LeMoan, that was fantastic on cattle and his friend Kathryn rode her in the reining and she was awesome! Twelve years later, I found out that one of my favorite mules, LeMoan, is not a mule! Until recent correspondence with Dr. Tex Taylor, who clued me in on LeMoan being a hinny, I had always thought LeMoan was a mule and I was bound to find out for sure!



Well, I didn't exactly know how to get in touch with Walter so through a friend (Tina Varga) I got Kathryn Bradley's email. Kathryn is a great friend and traveling companion of Walter's and I knew she would know for sure if LeMoan was a hinny and how to get in touch with Walter. I got the answers to both! Walter Nunn impressed me again, with the fact he has email and emails, not to mention he was also inducted into the Hall of Fame this year at Bishop Mule Days (2007)! He emailed me back and said 'yes, LeMoan is definitely a hinny.' For years I thought my favorite mule was a mule but nope she's a hinny! I studied the photos that Kathryn had sent me to see if I could tell any physical differences when comparing her to a mule and I could not. After finding out that LeMoan was a hinny I was curious to know more from Walter about raising and training hinnys. When I asked Walter about how many times he had to cover his jenny with the stallion, he replied, "I turned the stud in with the jenny and her bred her once or twice." It was a normal breeding schedule, the stallion was turned in with the jenny and she was bred once or twice and then she had a hinny! Unfortunately, Walter has not had any more hinnys and he has tried to re breed LeMoan's dam but no luck. I was also interested in knowing if the gestation length is similar to that of a mare carrying a mule. A lot of our mares typically carry the mule foals 11 $\frac{1}{2}$ months but I wondered if it would be the same or different if the jenny (since the donkey's gestation length is twelve months compared to the mare's being eleven months) was the mom. I did ask Walter but he couldn't remember.



Walter and LeMoan doing cattle work

I was also curious to know from Walter if training a hinny is similar to training a mule or more like a donkey. The hinny we own, James Dean, is super gentle but he was already broke when we got him so I missed out in terms of witnessing how he was started and how he reacted. Walter responded in his email, "LeMoan had a few donkey moments of just sulking up and not going forward and then she got over it." I think her multiple world championships in roping, cow working, cutting, and team penning speak for themselves! LeMoan and Walter Nunn are quite famous and are known from coast to coast for their many accomplishments in those events but I wonder what people will say when they find out like me that their favorite mule is a Hinny! Will this make more people want a hinny and then attempt to breed for hinnys?

I would like to know how many other mules are not mules but hinnys that are showing. I do know another hinny that has done quite well in the show ring. She's a beautiful, true tobiano, sorrel and white, 16 plus hand, hinny owned by Kick Ass Mules in Truth or Consequences, New Mexico. This hinny has been shown throughout the country by Sandy Dove and she too has done outstanding. This hinny will catch your eye if you have never seen her! I have tried to contact Sandy to get some photos but I have not been able to do so. I do know that they have tried to raise more but I believe the hinny's sire that was a paint horse passed away. This hinny like LeMoan is quite special and well trained. I was always impressed with this hinny because to me she was extremely "horsy" she moved more like a horse, more forward and correct, she seemed to have less resistance and more balance as she tracked.

If you have any experience raising hinnys please contact me because I would like to learn more about them. I truly believe there are more hinnys at our shows than we realize and it would be interesting to learn more about the challenges reproductively in trying to produce them, train them, etc. Dr. David Pugh did mention that when treating hinnys with sedatives that it's recommended to administer a dose more similar to what you

would give a donkey and the dosage of a sedative for a mule should be administered closer to that of a horse. Again, these suggestions from a veterinarian are facts that need to be known and practiced by all that own these animals. These suggestions also raise more questions in my mind such as feeding hinnys vs. mules vs. donkeys. If administering medications is different for each hybrid because their body's metabolism is different these are topics that should be researched more. Our manmade hybrids continue to intrigue us all and there is still so much to learn from them! I look forward to your comments and feedback about hinnys; you can email me at amule@bellsouth.net or mcleana5@msu.edu, or send information to Amy McLean 1284 Anthony Hall, Animal Science Department, Michigan State University, East Lansing, MI 48825. I will also be at the following shows this summer, Bishop Mule Days, Bishop, California and The Great Celebration Mule and Donkey Show, Shelbyville, TN look forward to hearing from y'all!

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