Report on Indian Lakes Holding Facility trip February 13, 2010
Eric Davis DVM MS DACVS DACVIM, Director, HSVMA Field Services

February 13, 2010 we traveled to 5676 Indian Lakes Road, Fallon, NV to observe the holding facility at that site and the horses housed there, and meet with the BLM personnel and private contractors responsible for the horses' care. Arriving at the facility we met Dean Bolstad and John Neill of the BLM; Dr. Richard Sanford, a contracted veterinarian working for the BLM; and Troy Adams the owner and operator of the facility. We spent 2 hours discussing the horses' care and the protocols used in their treatment, looking at the physical plant, and examining the horses. The following are the issues addressed and our findings:

- Handling facilities – The corrals, alley ways, and holding chute (squeeze) had been constructed in the last 3 months, with completion just 2 weeks prior to our visit. The layout was based on other working corrals (Palomino facility) with input from Temple Grandin. Though we did not see horses worked through the corrals and chute, based on previous experience with a variety of facility designs, the layout appeared to be excellently planned to minimize stress of the animals and maximize safety.
    - According to Dr. Sanford, the 200 or so horses, which had been recently worked in the unit, responded very well. The BLM personnel and the facility owner had made some minor modifications to the chute. This included welding an extension on the bottom of one side of the unit, because it was felt that the manufacturer had left too large of a gap where a horse's leg could become entrapped and injured.
    - It was clear that those working with the horses put thought and effort into improvements that would further increase horse safety.
    - Such issues as the height and width of the alley ways, the ability of horses to see motion around the chute, footing, chute padding, and extra gates (to make it possible to let a horse out in an emergency) were thoroughly addressed.
    - The handling or squeeze chute was of optimal design (Flying W) and was similar to units with which we have a lot of experience. These units hold horses safely and minimize stress.
- Housing, including fencing and shelter
    - The corral layout included 30 large paddocks and 12 hospital pens, with associated alleyways to allow feeding and movement of horses. The fencing was sturdy and safe. Feeding was done with hay on a concrete slab. The fencing allowing the horses to eat from the hay area was well thought out and safely constructed.
    - Though there were no overhead shelters for the horses, the hospital pens did have windbreaks constructed of heavy plywood and the larger paddocks had large mounds where the ground had been graded to form a wind barrier. While it does snow and rain in this part of Nevada such weather is rare and moisture rapidly disappears into the sandy soil. Cold stress comes primarily from wind chill and given the temperatures that occur in this climate, the barriers appear adequate.

    - We saw the unit in February and summer temperatures in Fallon will occasionally be in excess of 100 F. It may be desirable to provide shade in the summer months.
    - Horses were sorted into mare and stallion bands to prevent breeding and temptation that might get horses injured or stressed.
- Feed – The feeding of horses in the hospital pens for rehabilitation is discussed below. Generally the horses are initially fed grass hay immediately after arrival at the facility. Dr. Sanford and Dean Bolstad recognized that this diet is not the same as the pasture grasses and leafy plants to which these horses are adapted on the range.
    - Grass hay was used as it is the readily available fodder that is closest to the horse's natural diet.
    - After an initial adjustment period, alfalfa hay is mixed with the grass in increasing quantities. The contractor has a machine to mix the hay in the desired percentages and spread it in the feed bunks.
    - The switch to alfalfa is routinely made because of its digestibility, nutrient density, and availability. It was also mentioned that the BLM uses alfalfa forage because its quality is more consistent across the country than grass fodder. This allows horses to adapt more easily to adoption centers and adoptive homes.
- Water was available in large troughs situated in the center of each paddock and in the corner of the hospital pens. There seemed to be no problem with access to water.
- Condition of horses – After walking around the facility and observing horses in the large paddocks, the horses seemed to generally be in good condition.
    - A few mares had BCS's (Henneke scale) of 3. A few had some evidence of diarrhea.
    - Hair coats were generally long and rough, probably due to a combination of the time of year and the nutritional conditions encountered on the range prior to the gather.
    - The average BCS score was 5 or above, with most horses being 'in good flesh'.
- Deaths of adult mares gathered from the Calico range – We were shown 12 mares that were in the hospital pens. Dr. Sanford described their condition as being typical of the mares that had died or aborted after being gathered.
    - These horses were in extremely poor condition (BCS scores of 2 or less). Since the horses had only recently been removed from the range it would not be possible for them to lose such a large amount of weight in the holding facility. Indicating that a number of horses on the range were in a state of severe malnutrition.
    - The reason why a percentage of the 1922 horses gathered would be emaciated while others are in good condition is probably multifactorial. Age, musculoskeletal soundness, dental problems, stage of pregnancy, level of parasitism, and microconditions on the range where the horses were living could all play a role. Dr. Sanford mentioned that pregnant

mares, gathered in the winter, are usually in the poorest condition. In fact, it seems that the horses that died post gather were mares.

- If mares are coming into the facility in conditions similar to the ones observed in the hospital pens, it is not surprising that some would die as they are being "refed". Any animal whose nutritional intake is too low for its metabolic requirements for maintenance, activity, parasite load, growth, or pregnancy can drop into a catabolic state that changes their physiology and can have profound consequences for carbohydrate, fat, protein, and electrolyte metabolism. Hyperlipidemia, fatty liver syndrome, electrolyte imbalance, and organ failure often result. Even under the best medical management these sequelae can result in death.
- Problems associated with rehabilitating starved animals are classified as the "refeeding syndrome". The response of an individual to treatment is notoriously variable, and the exact approach to refeeding a starved horse (or any other animal) is an area of considerable medical controversy. I have had the experience of treating severely abused and debilitated horses at academic teaching hospitals and referral centers, and recognize that, under the best diagnostic and therapeutic conditions, rehabilitation is often unsuccessful.
- Dr. Sanford discussed his approach to alimenting the debilitated horses. These were well thought out, based on experience, and in line with accepted practices in veterinary medicine. It should be noted that while these horses can be difficult to treat successfully in a veterinary hospital, challenges such as avoiding stress in unsocialized horses (which could easily be fatal in severe debilitation) would make things worse. Diagnostic aids such as daily blood samples or treatments such as intravenous electrolytes would not be possible.
- The feeding plan used by the staff at the Indian Lakes facility involved starting debilitated horses on grass hay, rather than alfalfa. Horses are maintained on grass hay for 3-4 weeks and then the nutritional value of the diet is slowly increased by adding alfalfa hay in approximately 4 - 6 day increments. The facility manager said that he would provide us with a certified feed analysis of the hays provided, but the grass and alfalfa hay observed at the facility was grossly of excellent quality. Dr. Sanford discussed other approaches that they had tried in the past, as this is not a unique problem to the Calico herd. The gradual transition from grass to alfalfa had, in his estimation, been the most successful approach, given the difficulties inherent in assessing the medical progress of mustangs and the necessity of feeding them in a herd situation.
- In discussing the circumstances surrounding the deaths of the mares mentioned above, there were no symptoms described that would lead one to believe that they had colic.
- The late term abortions that occurred in this to mares in this herd were apparently due to a combination of poor body condition and stress inherent in gathering and transport. The same metabolic problems that result in hyperlipidemia, fatty liver syndrome, and the other problems

discussed above will also be deleterious to fetal survival. One foal had been born normally to a mare in one of the pens the night before our visit to the Indian Lakes facility.
    - Dr. Sanford had done necropsies (autopsies) on the horses that died and laboratory analysis had been done on blood samples, using a local veterinary laboratory. The gross findings he described were consistent with hyperlipidemia/hyperlipemia and "refeeding syndrome", including pale streaks on the liver, minimal internal body fat, and opaque serum. We did not look at any of the laboratory reports and were not told whether histopathology had been done on any necropsy tissues. This was an oversight on my part and Dr. Sanford has been asked to provide documentation.
- Deaths of two colts whose feet had sloughed were discussed. Dean Bolstad and Dr. Sanford commented that when horses are gathered in the winter and there are foals present a small percentage develop some degree of lameness caused by the rocky terrain of the Calico Complex. This gather was planned during the winter when snow is present in to minimize this issue.
    - Most often this is the result of treatable sub-solar abscesses that are presumably caused by running on hard ground.
    - When these abscesses occur in multiple feet so that the young horses are unable to stand or if they progress to complete sloughing of the hoof wall the foals may require euthanasia.
    - While hoof wall can grow back if the coronary tissue and primary dermal laminae have not been damaged, it would be very difficult to successfully manage a complete hoof wall slough on an ungentled animal and under the conditions at a holding facility.
    - Where the tissue damage is severe enough the potential for the horse having a reasonable quality of life is poor enough that euthanasia would seem to be the most humane treatment.
    - We did not see the foals that died and had only verbal information on the condition of their feet.
    - One of the foals was also described as being emaciated. So metabolic problems associated with starvation may have contributed to the foot slough by damaging the laminae of the involved feet.
    - There was one other horse in the hospital pens that was lame, evidently from a hoof abscess that was improving. In watching horses in the large paddocks move around, serious lameness was not noted.
- The staff demonstrated the use of the squeeze chute and Dr. Sanford described his anesthetic protocol for castrating stallions at the facility.
    - The anesthetics and dosages described are typical for equine field castrations and are within accepted standard of practice.
    - An ultra short acting paralytic agent, succinyl choline, is used to immobilize the horse prior to the administration of a xylazine and ketamine combination, which causes unconsciousness and analgesia.
    - The use of succinyl choline makes sense in the context of working with wild horses where rapid induction of anesthesia is desirable to prevent

injuries caused by struggling in the restraint equipment. The resulting anesthetic recoveries were also described as being smooth. Recovery from anesthesia can be dangerous in horses that become very agitated, prior to induction. Rapid immobilization made this less of a problem in Dr. Sanford's experience.
    - Resuscitation equipment was available for horses that became apnic (stopped breathing) under anesthesia. Apparently this does happen occasionally using the described anesthesia protocol, and there have been a very small number of deaths occur.
    - Additional analgesic and antibiotic therapy was discussed. Using non-steroidal anti-inflammatory drugs and/or long term local anesthetics is planned for future castrations, though they have not been routinely used in the past.
    - The complications associated with the actual castration surgery seemed to be the standard type (scrotal swelling and stiffness) and were described as occurring at expected rates. When these complications occur they are treated with analgesics and antibiotics, as would be the case in any veterinary practice. The outcomes described were as good or better than published results.
    - Dr. Sanford does all the surgeries, including removal of cryptorchid testes. In discussing surgical technique, it was clear that he has a lot of experience and skill, uses optimal procedures, and cares about his patients.
- We did not see any indication of infectious disease in this herd, though it was mentioned that one mare was in quarantine with what could be Strep equi (strangles) infection. (Tests came back and Strep zoo was found – no Strep equi. Pneumonia was later determined to be the problem) Apparently, though this disease has been a big problem with some holding facilities, it has not been a problem in this herd. As part of the vaccination program the horses at Indian Lakes are being immunized against Strep, using the intramuscular M protein vaccine.
- Parasites, (including Parascaris equorum, stongyles, and cyathostomes) are a problem in this herd, based on adult parasites found in feces.
    - There must be places on the Calico range with enough moisture to allow development of the infective forms of the strongyle worms.
    - The horses are dewormed during processing and the sandy, dry conditions make parasite transmission in the adults very unlikely.
    - Foals would be exposed to ascarids, though there were relatively few foals present. We did not discuss redosing young horses to control ascarid infection.
    - Plans for fecal removal and general sanitation are reasonable.
    - Parasitism may have contributed to the poor condition of some of the horses gathered, though the parasite load in horses that were necropsied was not mentioned.
- The staff at the facility was asked directly about the use of electric cattle prods on horses during loading, unloading, and processing. Their comments were that electric prods were present but were only used when horses could not be coaxed

ahead in any other way. More frequent use created anxiety in the horses and made the handling process more difficult.