



Two Projects Investigating Shade for Wild Horses and Burros at BLM's Palomino Valley Center

National WH&B Advisory Board Meeting
Oklahoma City – Sep 2-3, 2015

Albert Kane, DVM, MPVM, PhD; USDA APHIS
Paul Griffin, PhD; USDO I BLM

Two Shade-related Research Projects

- Commissioned by BLM following a brainstorming shade workshop hosted by BLM in August 2013
 - 1) Shade research project
 - UC Davis, School of Veterinary Medicine
 - Kathryn Holcomb, PhD and Carolyn Stull, PhD
 - 2) Thermal profile assessment
 - USDA APHIS, Center for Animal Welfare
 - Vaughan Langman, PhD; Nora Wineland, DVM, MS

#1

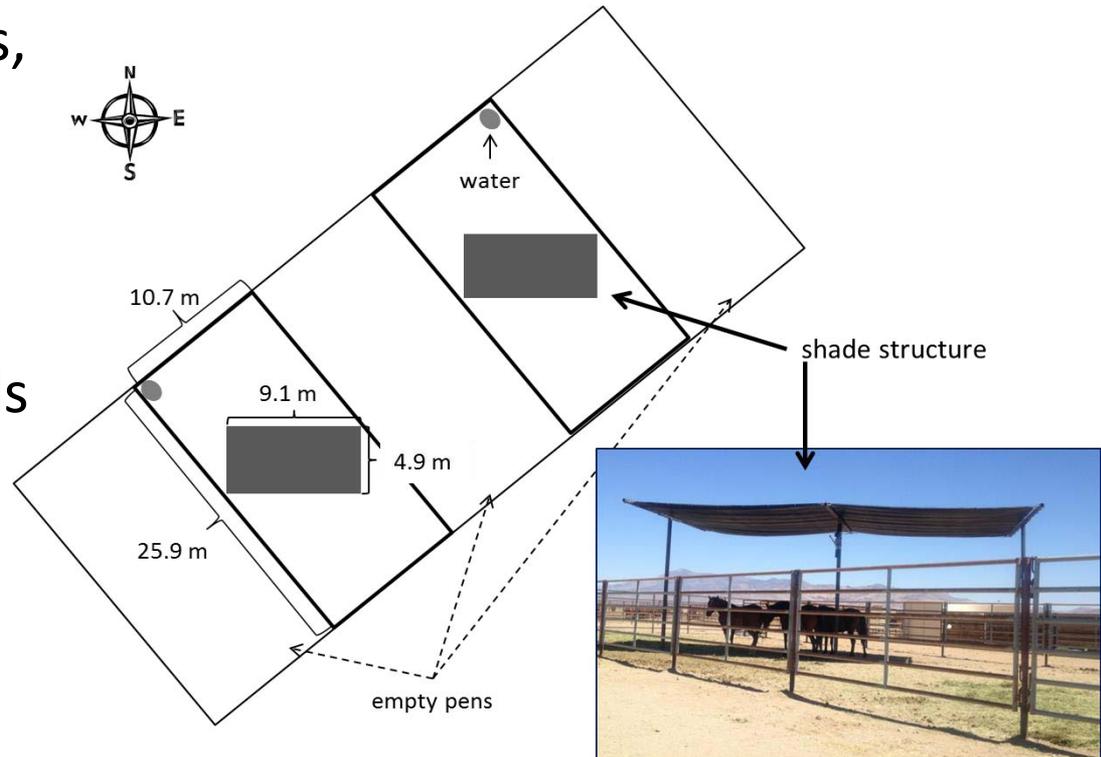
Characteristics of Shade Use by Captive Wild Horses (UC Davis)

- Objective – characterize the use of shade by captive wild horses in a BLM holding facility
 - examine the time spent in the shade when offered the opportunity to choose shade or full sun
 - compare use of shade to random distribution in pen
 - measured UV radiation



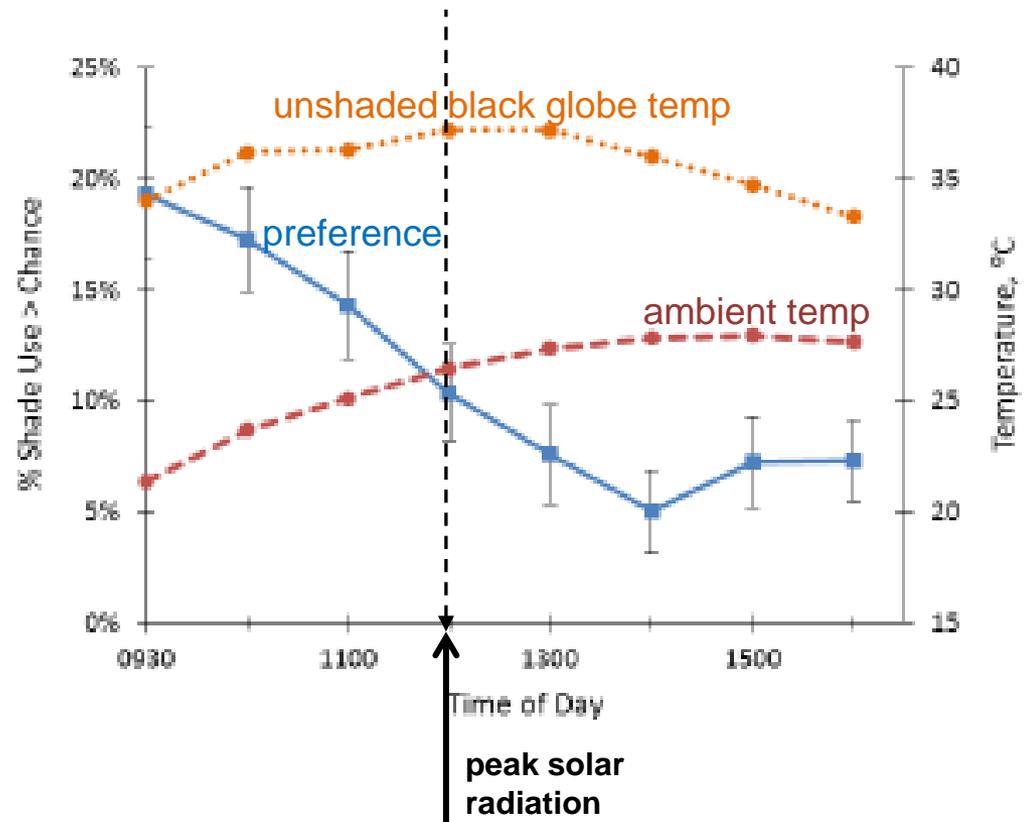
Characteristics of Shade Use by Captive Wild Horses (UC Davis)

- Methods – 2 groups of 4 mares in two small pens, each contained a 16x30 overhead shade structure
- Data collected for 5 days, switched pens, 5 more
- Four trials = 32 horses
- Measured
 - length of time periods
 - total amount of time
 - preference for shade compared to chance based on shady area
(hourly preference = % of observations in shade - % of pen in shade)



Characteristics of Shade Use by Captive Wild Horses (UC Davis)

- Results: horses in the shade for 25.6% of observations
 - preference of 11% greater than chance
 - averaged 108 min in shade / day
 - average 'bout' = 6 min
 - average # of 'bouts' = 17
 - used more shade in AM



Characteristics of Shade Use by Captive Wild Horses (UC Davis)

- Author's Conclusions
 - horses prefer access to shade in hot sunny environments
 - horses use shade frequently, for short periods of time
 - the authors suggest that compromised horses may use shade more than healthy horses, though that was not studied



#2

Evaluation of WH&B Thermal Environment at PVC (USDA)

- Objective – to assess the thermal balance (heat gain and heat loss) of wild horses and burros housed at Palomino Valley during a summer month
- Question - Do WH&B experience thermal stress in summer if not provided access to shaded areas?



Evaluation of WH&B

Thermal Environment at PVC (USDA)

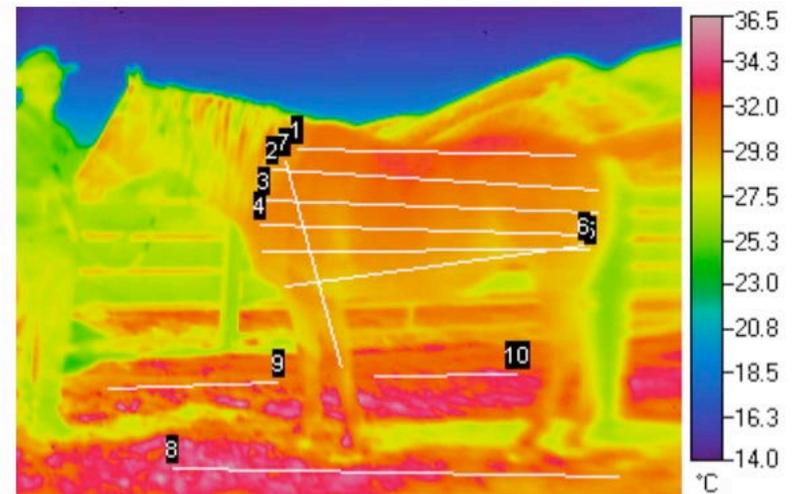
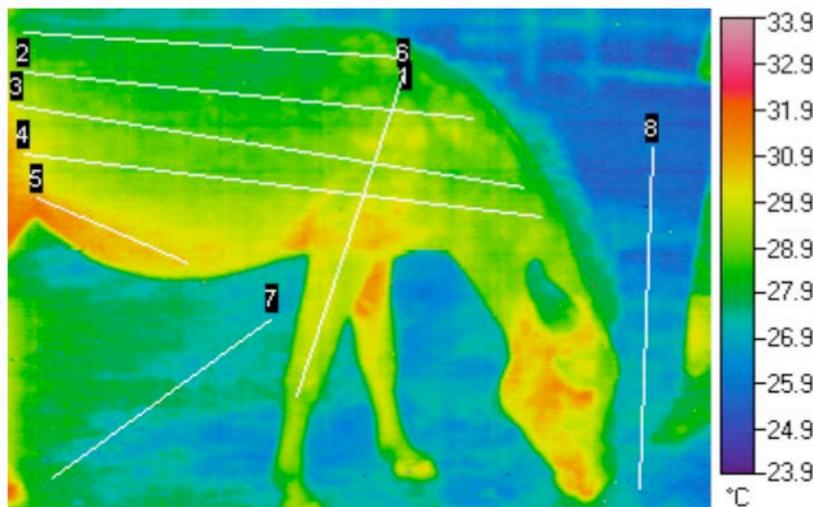
- Methods – measured direct, reflected and diffuse solar radiation; temperature of ground, structures, air
 - Measured temperature of animal
 - Estimate metabolic heat being produced
 - Measured % heat absorbance and reflectance of animal's coat including different colors
 - Calculated solar heat gain
 - Calculated longwave radiation heat gain from surroundings, and heat loss from animal surface

Evaluation of WH&B

Thermal Environment at PVC (USDA)



Measuring surface temperatures of animal and surroundings with a thermal imager



Evaluation of WH&B Thermal Environment at PVC (USDA)



Measuring shortwave radiation from environment and direct and reflected radiation from 5 different colored horses and 3 burros



Evaluation of WH&B

Thermal Environment at PVC (USDA)

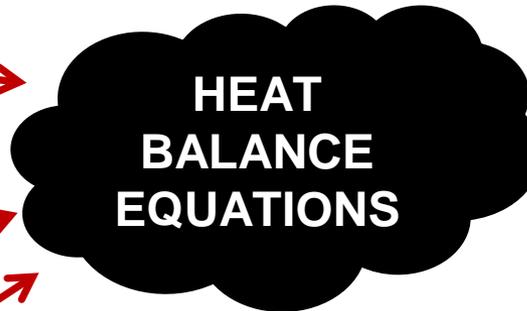
- Heat balance equations calculate net heat gain or loss

**solar radiation
absorbed / reflected**

**heat absorbed,
reflected**

metabolic heat

evaporative cooling



sweating



Thermally
neutral zone

shivering

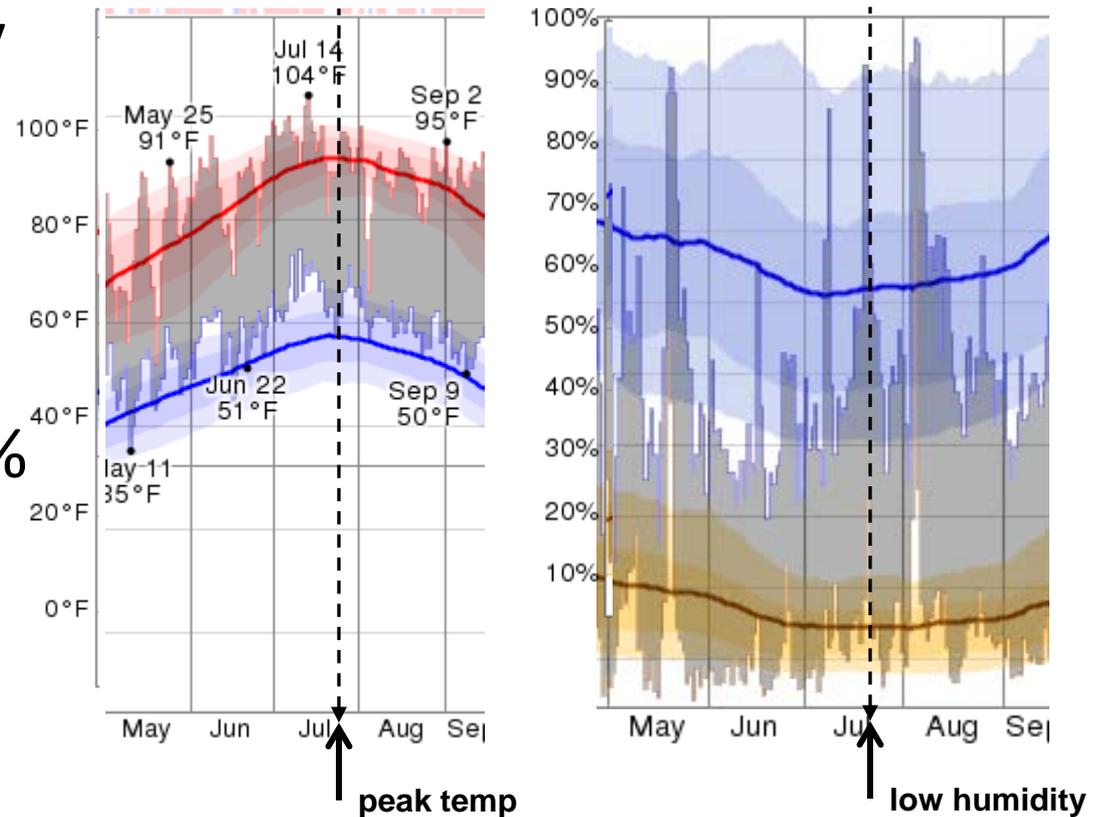


- Horse's lower critical outside temperature = 41°F
- Horse's upper critical outside temperature = 77°F
 - outside this range, compensate for heat loss or gain
 - horses primarily lose heat through sweating
 - up to 3 gal/hour

Evaluation of WH&B

Thermal Environment at PVC (USDA)

- Results – July is the month of highest temperatures and lowest humidity
 - ave high 95°F (ave low ~58°F)
- typical daytime relative humidity <20%



Evaluation of WH&B

Thermal Environment at PVC (USDA)

- Results – there was little variation in the heat balance measurements of solar radiation, and longwave heat gain radiation from the sky and ground
- Calculated sweat rates for solar absorbance of coat colors and heat gain above neutral revealed sweating at less than half of the maximum rates possible
- Horses and burros compensate for daily excursions above their upper critical temperature of 77°F by sweating efficiently in the very dry environment

Evaluation of WH&B

Thermal Environment at PVC (USDA Study)

- Authors' Conclusions
 - WH&B in this study sweated efficiently; even without shade they did not experience thermal stress
 - Animals were observed to be receiving ample amounts of water, food and trace minerals; those factors could influence sweating rate
- Authors' Recommendation – WH&B do not appear to require shade in this environment to cope with high temperatures and solar radiation typical for this area

Take Home Messages

1. Small groups of wild horse mares held in small pens will use shade if it is provided to them.
2. Shade use may not necessarily be most common during the hottest part of the day.
3. UC Davis authors suggested that compromised animals may use and benefit from shade more than fit, healthy animals, though that was not studied.
4. Even without shade, animals did not experience thermal stress in the very hot, sunny facilities at PVC.
5. WH&B may have a preference for shade during some times of day, but it is not required for their well-being.

Questions?



(T-frame shade structure from UC Davis study, in use at Palomino Valley)