Optimizing Pairing Practices for Female New Zealand White Rabbits (*Oryctolagus cuniculus*)

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Introduction

- The University of Michigan's Unit for Laboratory Animal Medicine (ULAM) manages a large transgenic breeding colony of New Zealand White Rabbits (NZW), with an average yearly census of up to 400 rabbits.
- Within the last year, ULAM has created and maintained 172 pairs of rabbits. Male and female rabbits are pair-housed upon weaning and often only become singly housed upon experimental necessity.
- Upon review of literature and consultation with other institutions[1,2,4,5,6], ULAM also began pairing adult female NZWs newly arrived from the vendor by leveraging their shared stress from shipping to enhance social bonding, and marking with buck urine to signal a social grouping.
- Pairing new arrival NZWs has been very successful, with a current success rate of 94% (n=31 pairs), while pairing attrition NZWs had a success rate of only 50% (n=4 pairs). These results indicate adequate shared stress (stress-bonding) is an important component for successful pair introductions.
- In addition to stress-bonding, the idea of matching pairs based on temperament was adopted, using the Latency to Approach a Novel Object method [8] (LA) (Fig. 4).
- Established pairs in the vivarium were evaluated for temperament using LA (Fig. 1-4). Rabbits that scored 35 seconds or less were classified as Dominants while rabbits that scored one minute or more were classified as Subordinates (Fig. 5)
- Using this as a baseline, pair introductions were made using these latency score thresholds to predict more compatible pairs. We predicted that temperament testing, coupled with stress-bonding and buck urine marking would render a more successful rabbit pairing program.

Methods

Figure 1. Pair Evaluation Methods

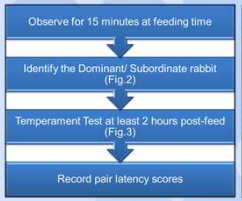
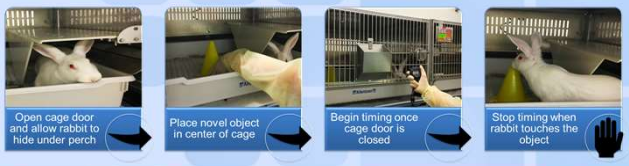


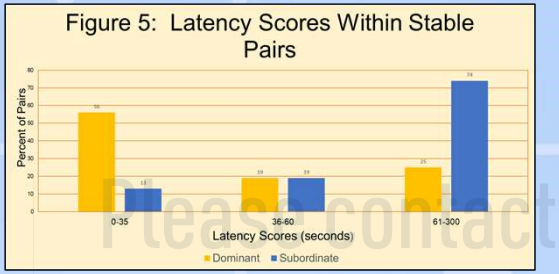
Figure 2. Identifying Behaviors

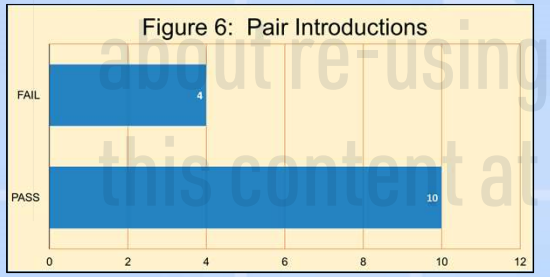
Figure 3. Pair Success

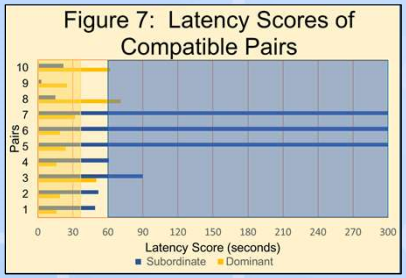
Figure 4. Temperament Test



Results







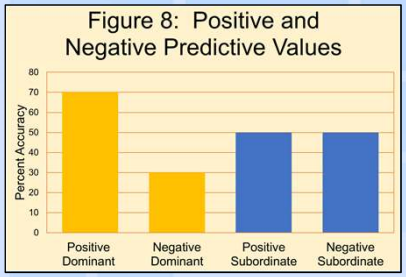


Fig. 5. Established pairs within the existing colony (n=16 pairs) were evaluated for identifying behaviors and given temperament tests to provide baseline thresholds.
Fig. 6. Pair introductions were conducted using temperament test matching of 28 attrition rabbits (n=14 pairs). Dominant (< 35 sec) and subordinate (>60 sec) latency scores were matched. Pass Pairs were deemed compatible, and Fail Pairs were deemed incompatible.
Fig. 7. Of the compatible pairs (n=10 pairs), resulting dominants and subordinates were identified with corresponding latency scores from temperament tests given before introduction. (yellow/blue shading indicates dominant/subordinate thresholds)
Fig. 8. Of the compatible pairs (n=10 pairs), rabbits identified as resulting dominants had latency scores under 35 seconds (Positive Dominant) or over 35 seconds (Negative Dominants). Rabbits identified as resulting subordinates had latency scores over 60 seconds (Positive Subordinate) or under 60 seconds (Negative Subordinate).

Discussion

- Pair Introductions made by temperament test matching has a current success rate of 71% (n=14 pairs) as shown in Figure 6.
- Of the ten compatible pairs, predicted dominants were 70% accurate and predicted subordinates were 50% accurate as shown in Figure 8.
- Of the ten compatible pairs, all had a minimum difference of 22 seconds between latency scores. 70% had an average difference of 38 seconds between latency scores. This may indicate the spread between latency scores may be more significant than the actual numerical values, as shown in Figure 7.

Conclusion

- Pair introductions utilizing temperament testing creates an increased ability to match compatible female NZWs, allowing for a greater chance of creating a successful pair.
- It must be considered that rabbit pair failure does not necessarily reflect the ability to be pair-housed, but rather the incompatibility between individuals.

Future Directions

- Further research is underway to consistently evaluate established pairs by using the LA temperament testing model. We will evaluate the effect of pair stability and longevity as it relates to temperament scores, and investigate if there are additional metrics that can better predict pair compatibility.
- Considerations are also being made on environmental and physiological factors which might affect pair introductions and stability, such as room changes, other conspecifics in the room, sexual maturity, and experimental activity.
- In this study, we have thus far matched only dominant and subordinate latency scores as established with our baseline pairs. Future tests will evaluate pairing two subordinate scores, or scores that fall within the gap between dominant and subordinate scores (between 35 and 60 seconds).

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