Comparison of Sire Conception Rates in Rhesus Macaque (Macaca mulatta) Males Between Two Harem Breeding Arrangements

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Formed in the 1990s

- Supply JHU with SPF Indian-origin rhesus
- Approximately 280 rhesus
- Breed in harems



- Breeding season ranges from mid-late September to early February.
- Colony births range from early March to August. Occasionally we have conceptions outside of the breeding season.
- Males are weaned during the following birth season (around 12-16 months of age)
- Females remain in natal groups
- Breeding males are moved to new harems when the oldest daughter is 3.



- ► 19 Harem Groups
 - ► 5-33 Individuals
 - ▶1 breeding male
 - ▶ 3 19 sexually mature females
 - Sub-adult/juvenile females, and infant males/females
- 16 Breeding Males



▶ Prior to 2013

- Shortage of breeding males
 - Harems were combined
 - ► Fighting/ Injury
 - Separation of groups
 - Resulted in formation of new groups
 - Harems went without breeding males
 - Reduced the colony's potential birth rate
 - Per diems spent on females that weren't bred



Solution to male shortage:

- Alternate males during the breeding season between two harems
 - Alternate every 6 weeks
 - Continue after breeding season
 - Maintain rank/ relationships within groups
- Determine if sire conception rate (SCR) was affected



- 2013/2014 Breeding Season
 - 1 male was chosen to alternate between 2 harems and SCR calculated:
 - Single-Harem Breeding Season
 - ▶ 2012/2013
 - ▶ SCR- 71.4%
 - ► 7 sexually mature females
 - ▶ 5 births
 - ► Single-Harem Breeding Season
 - Alternating-Harem Breeding Season
 - ▶ 2013/2014
 - ▶ SCR- 66.7%
 - ► 15 sexually mature females
 - ▶ 10 births



Number of Births and Number of Sexually Mature Females Available

Breeding Season	Male A	Male B	Male C	Male D	Male E	Male F	Male G
2011/ 2012				2/3			
2012/ 2013	5/7	10/15	5/5	6/7			
2013/ 2014	10/15	5/6	3/7	5/8	1/1		
2014/ 2015	8/15	7/8	7/9	9/12	5/7		
2015/ 2016	8/12	4/9	6/11	8/13	6/7	8/11	4/4
2016/ 2017	14/22	8/9	3/3	8/13	7/10	13/15	4/7

Single-Harem

Average SCR for Two Breeding Techniques

Breeding Season	Male A	Male B	Male C	Male D	Male E	Male F	Male G
Single- Harem SCR	71.4	71.4	73.3	72.2	100	72.3	100
Alternating- Harem SCR	62.5	73.1	65	65.8	81	86.7	57

Results

Breeding Season	Average SCR	Average Number of Births	Average Number of Sexually Mature Females
Single- Harem Breeding Season	74%	4.8	6.4
Alternating- Harem Breeding Season	68.5%	7.7	11.2

Future Plans

- Continue to alternate males when needed
 - ► No significant difference in SCR
- Short-term solution
 - Reduce number of years males can breed within colony
 - Males go through introduction more frequently
 - ► High stress
 - Increase for wounding at introduction



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VOEN Analytics Conference 2018 Impact Summary

Title: Comparison of Sire Conception Rates in Rhesus Macaque (Macaca mulatta) Males Between Two Harem Breeding Arrangements

Problem and analysis method: Sire conception rates (SCR) (births/ number of adult females each male had access to during the breeding season) of seven males were compared between single-harem breeding seasons and alternating harem breeding seasons.

Summary: SCR during single-harem breeding seasons was 74% compared to 68.5% during alternating-harem breeding seasons. Males were housed with access to an average of 4.8 additional females during the alternating-harem breeding season, resulting in an average of 2.9 additional births.

Impact of the analytics study

Decisions made/Actions Taken: When a limited number of breeding males are available, alternating males between harems is an effective breeding management procedure in order to allow more females access to males for breeding.

Calculated or actual Improvements:

Animal Welfare reduced stress and fighting associated with combining unfamiliar harems.

Resource use reduced hours required by veterinary and technical staffs for treating wounds sustained during combining harems. Decreased time required by behavioral staff to monitor new groups. Increased the number of females with access to males reducing.

Cost avoidance sexually mature females are no longer sit fallow for a breeding season (per diems-food, staff pay (technical, veterinary, and behavioral). Allowing all sexually mature females access to a breeding male increases overall birth rates- revenue for the farm.

