



How the COVID-19 Lockdown Affected the Behavior of Education Animals at the Santa Ana Zoo



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Abstract

One concern that animal advocates have regarding zoos, is the stress that human-animal interactions cause. Some claim that large groups of people can raise the amount of cortisol (stress hormone) that animals produce. However, other advocates are proponents of these human-animal interactions as it provides enrichment that helps to relieve stress.

The most non-invasive way of measuring an animal's stress levels is to observe its behavior. This study took advantage of the unique situation granted by the COVID-19 pandemic to observe ambassador animals when surrounded only by a small group of familiar people (zoo education/animal care staff).

RESULTS

Visitor density had a significant effect ($p < .001$) on each of the five behaviors recorded: moving, resting, reproductive, social, and aggressive (Tables 1–5). Animals spent significantly ($p < .05$) more time resting during the periods of zero and low levels of visitor density than during high and extreme densities (Tables 2 and 3). There was no significant effect of zero and low level of visitor density on the frequency of reproductive and social behaviors. High and extremely high levels of visitor density influenced moving, resting, reproductive, social, and aggressive behaviors ($p < .05$; Tables 4 and 5).
The mean levels of cortisol were recorded at the zero (35.44 ± 4.84 ng/g), low (55.07 ± 5.57 ng/g), high (113.51 ± 3.70 ng/g), and extremely high (137.30 ± 5.88 ng/g) levels of zoo visitor density. The one-way ANOVA with post hoc comparison (Duncan's Multiple Range Test) clearly showed that the average fecal cortisol concentration was significantly ($p < .05$) higher during high and extremely high levels of zoo visitor density than during the zero and low levels (Tables 6 and 7).

TABLE 1
ANOVA With Post Hoc Comparison (One-Way) of Five Behaviors in Four Conditions of Zoo Visitor Density

Zoo Visitor Density	Sum of Squares	df	Mean Square	F	Sign.
Zero level density	Between groups	4737.753	4	1184.433	96.509 <.0001*
	Within groups	1222.267	70	17.461	
	Total	5960.020	74		
Low level density	Between groups	3483.987	4	870.997	85.935 <.0001*
	Within groups	770.000	70	11.000	
	Total	4253.987	74		
High level density	Between groups	3503.333	4	875.833	63.458 <.0001*
	Within groups	802.667	70	11.481	
	Total	4306.000	74		
Extremely high level density	Between groups	5380.723	4	1345.181	101.733 <.0001*
	Within groups	545.277	70	7.790	
	Total	5926.000	74		

Note: The means were compared using Duncan's Multiple Range Test. The means gave scores of zero, low, high, and extremely high visitor density conditions for five behaviors in statistically significant.

*High statistical significance ($p < .001$).

Background

Education animals, also known as ambassador animals, are animals at zoos that interact with the public. In the case of the Santa Ana Zoo, these interactions take place in the form of education programs. This includes reading and speaking to groups (usually of a younger audience) several times a week. These interactions serve to provide education for the public and enrichment for the animals.

Enrichment is an outlet for animals kept in captivity. It can take several forms, both physical activity and mental stimulation. Here, our focus is on mental stimulation. One way to provide mental stimulation is the introduction to novel stimuli. Interactions with people are a great source of novel stimulus as no two interactions are ever the same.

When the COVID-19 pandemic caused public spaces to close to the general population, this stimuli was removed from the routine of zoo animals. Thus, this research aims to look at the lack of people, and its effect on animals via their behavior.



Findings

Interviews conducted with keeper staff and the zoo curator revealed that, among ambassador animals, they observed “basically no difference in behavior.” Some keepers stated that select birds (a pair of blue and yellow macaws kept in an open-air habitat during the day and occasionally participating in education programs) were “resistant to crating.” That is, the action of going into a crate so that they may be moved from their open-air habitat to an enclosure to keep them safe overnight.

Animals still received a large amount enrichment in the form of novel stimuli. Animals were walked around the zoo to areas they had never seen before. With no guests in the zoo, staff were able to provide more opportunities for the animals to travel throughout the zoo during the day. One keeper recalled “letting the goats roam free around the farm.” Education programs persisted through Zoom and Facebook Live.

Interviews with staff revealed that the most behavior changes occurred in non-ambassador animals – the highly socialable crested capuchins and the black howler monkey. These species would sit towards the front of their enclosures and “seemed depressed.” Direct contact with non-human primates is advised against in Association of Zoos & Aquariums (AZA) guidelines. Thus, the novel stimuli provided to ambassador animals that could carried/lead around the zoo could not be provided to the primates.

Conclusion

The lack of large crowds during the era of lockdown did not affect the behavior of education animals at the Santa Ana Zoo. This is likely due to the combined efforts of education and animal care staff providing as much novel stimuli as possible. Had the staff been unable to be as hands on with the animals as they were, it's likely the animals would have been negatively affected. As was seen in the capuchin and howler monkeys.

Therefore, it is the quality of human interaction, rather than the quantity of people, that provides the enrichment needed for ambassador animals to maintain stable behaviors.

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