The Effects of Variant Auditory Stimuli On Goat Kids' Formant Patterns from Birth to Weaning

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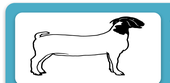
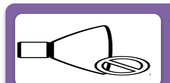
Introduction

- Limited research has been conducted regarding the effect of human voice exposure on an animal's call during early development.
- Wildlife catch and release programs aim to rehabilitate animals in hope to successfully reintegrate them back into their natural habitats. Animals are returned to their natural environment once they have been deemed capable to survive without the support of human caretakers (Aslan et. al). During this time the animals are exposed to human voice frequencies.
- It has been documented that mammals use vocal signals in both mate attraction and intrasexual competition (Pitcher et. al). An altered call could result in an animal's inability to return to its natural ecosystem and participate in a functioning food web and breeding system.
- If the frequencies of an animal's call are affected by mimicry of human vocalization, then animals rehabilitated in captivity could develop an altered call making reintegration unsuccessful.

Objective

To determine if exposure to human voice during early development affected the frequency of vocal harmonics in Boer-cross goat kids.

Table 1 Treatment groups 1-3 elaborated

	Treatment 1 (n=5) Exposed to human vocalizations via recording
	Treatment 2 (n=4) Exposed to Adult dams vocalizations
	Treatment 3 (n=4) Exposed no human or dam vocalizations

Materials and Methods

- Directly after parturition, 13 Boer cross kids were relocated randomly by birth order into the three treatment groups (Table 1).
- Recordings of the goat's bleats were conducted weekly utilizing a Blue Snowball iCE condenser microphone and laptop with VoceVista software.
- A recording was collected from isolated goat kid for as long as necessary (no longer than 10 mins) to collect a strong, uninduced bleat from each goat kid. This was continued for 7 weeks after parturition throughout all treatment groups.
- The fundamental frequency, 2nd Harmonic, 3rd Harmonic, 4th Harmonic and 5th Harmonic of the kid's bleat was determined and were collected at five locations throughout the recording.
- The weekly averages for the three treatments frequencies were compared to determine if there was a significant difference between the three treatments.

Results

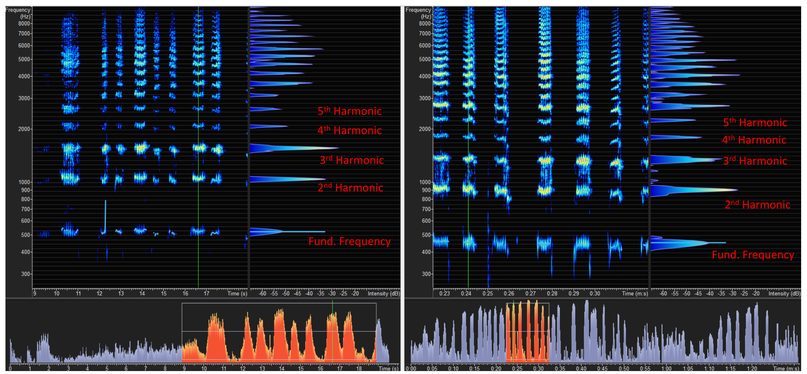


Figure 1 Snapshot of VoceVista software for dam exposed kid recording comparing week 1 and week 7 respectfully using logarithmic scale.

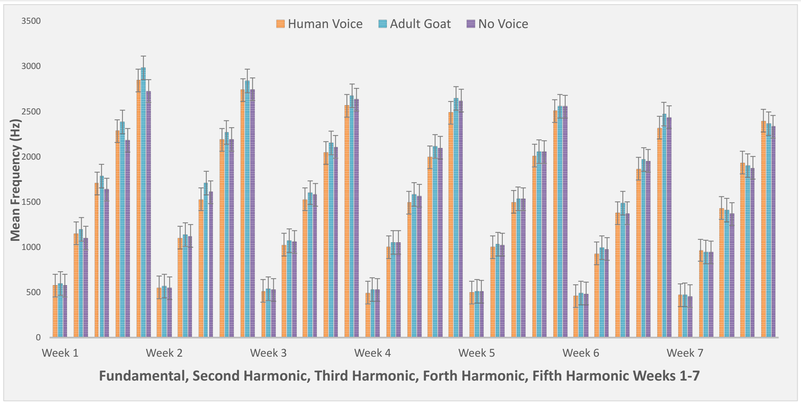


Figure 2 Average fundamental frequency, second harmonic, third harmonic, fourth harmonic and fifth harmonic of 3 treatment groups over the 7 weeks.

Table 2

Average fundamental frequency, second harmonic, third harmonic, fourth harmonic, fifth harmonic of all three treatments over the 7 weeks

Average	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
Fundamental Frequency (Hz)	573.34	555.91	524.56	514.65	505.35	478.49	467.35
Second Harmonic (Hz)	1149.46	1118.95	1049.27	1033.71	1016.31	961.68	950.68
Third Harmonic (Hz)	1711.46	1606.26	1566.99	1543.29	1520.54	1408.23	1403.40
Fourth Harmonic (Hz)	2282.20	2214.31	2093.71	2062.51	2035.32	1925.03	1905.75
Fifth Harmonic (Hz)	2850.43	2770.71	2620.51	2574.97	2537.99	2399.89	2368.21

There was no significant difference ($P<0.05$) found between the three treatment groups throughout the study. However, a significant difference was found between the fundamental frequency, second, third, fourth, and fifth harmonics over the 7 week period (Table 2).

Conclusions

The results of this study indicate that as the kids developed over the 7 week period their frequencies progressively lowered. No significant difference was found between various auditory exposures among the three treatment groups fundamental frequency and harmonics. Since the lowering of the harmonics was present in all three treatments it can be assumed that it was due solely to the development of the kids over the 7 weeks.

References & Acknowledgements

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Pitcher, B., Briefer, E., McElligott, A. (2015). Intrasexual selection drives sensitivity to pitch, formants, and duration in competitive call of fallow bucks. *BMC Evolutionary Biology*, doi: 10.1186/s12862-015-0429-7