Research Networking Programmes

Short Visit Grant ☐ or Exchange Visit Grant ☒

(please tick the relevant box)

Scientific Report

The scientific report (WORD or PDF file – maximum of eight A4 pages) should be submitted online within one month of the event. It will be published on the ESF website.

Proposal Title: *Phenotypic study of captivity-induced plasticity in wild boars (Sus scrofa)*

Application Reference N°: 4547

1) Purpose of the visit

As stated in the proposal, the present 3-month exchange visit's purpose was to establish the wild boar vocal repertoire, using acoustic recordings and behavioural observations on a group of wild boars that were available at the host's institution. This represents the first step of a longer-term project and provides a strong and essential basis to carry on shared research between the 3 institutions involved (the Museum National d'Histoire Naturelle (MNHN), and the Institut National de la Recherche Agronomique (INRA), France, on the one side, and the Cogbio Lab_department of Cognitive Biology, University of Vienna on the other side). This longer-term project aims at investigating the slight changes brought by living in a domestication context as compared to wild. Knowing more about the vocal repertoire will allow a better understanding of the way wild boars perceive their environment and interact with each other, and help us gain insight concerning the behaviours of their closest relative, the domestic pig.

The long-term project, which depends entirely on this exchange visit's outcome, will investigate the ontogeny of the vocal apparatus and which are the phenotypic changes induced on acoustic

communication by assessing the effect(s) of domestication (on animals living in semi-natural condition vs. in individual pens). Knowing more about this species repertoire is hence decisive. Eventually, the applied goal of this research is to use acoustics as a way to monitor suidae's internal state to a further extent than currently done. This wil also make pig industry more knowledgeable concerning the required conditions for better housing quality and breeding programs. Thus from establishing the vocal repertoire as a first step, the final collaboration project will deal with animal wellfare, husbandry conditions and species/breed conservation.

2) Description of the work carried out during the visit

It is important to note that an unexpected event occurred in the early stage of the visit: some captured animals were diagnosed positive to PRRS (Porcine Reproductive and Respiratory Syndrom). While this disease does not prevent the animals from living a rather normal life, it threatened the long-term project because of sanitary conditions (animals have to eventually be CT-Scanned at INRA) and the group had to be euthanized.

The host's institution and members made it up to the situation by contacting a known wild boar local breeder who could supply new, disease-free animals. His parks were made accessible to Maxime Garcia (ESF Grant trustee) so that he could make the behavioural observations and acoustic recordings, purpose of the visit.

By studying the available population intensively, with a constant presence in the field, MG could get close enough to the animals to observe and record natural behaviours and vocalizations. A special situation of capture and following housing (in a stable owned by the breeder) allowed him to record sounds made impossible to get in the outdoor parks because of their production patterns (very low level and low frequency sounds).

Part of the Exchange visit's period also consisted in developping tools useful for subsequent analysis, and some advanced programing was done on a sound analysis software, to pursue with data processing (which has now started).

3) Description of the main results obtained

Even tough data acquisition was made extremely hard because of non-controlled, natural conditions (wind, non-vocal noises made by the species of interest and other species, rain, anthropogenic noise,

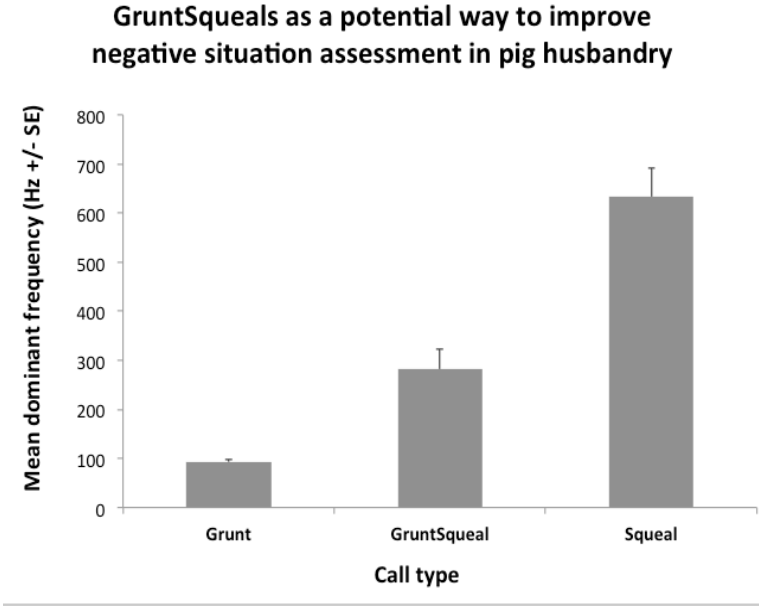
hardly recordable sounds due to production characteristics…), several thousand of calls could be recorded, among which more than 800 were assessed as of good quality for further analysis.

A primary analysis reveals that high pitched calls are expressed in negavitive valence situations. This confirms what has been found in studies carried on domestic pigs and welfare assessment.

The novelty of the results, from what comes out in this preliminary stage of the data analysis, is that not only what can be decribed as "screams" or "squeal" (high frequency calls) are emitted in negative situations. Even what has been called has "grunts" (low frequency calls) can be emitted in such context.

It seems that there is a continuum in the calls produced in this species, translating into their internal state: more specifically, a gradation in the signal can emerge, related to the state of arousal of an individual: potentially, an increasing negative valence could be correlated with a transition from low frequency to high frequency calls (e.g: from "grunts" to "squeals"/"screams") as well as with a transition from a voiced signal to a signal containing Non-Linear Phenomena (an occurrence in many mammal acoustic signals, which has been suggested to be a cue to a high arousal state and attention grabbing).

As an example, the following graph shows how grunts that are produced in negative situation (here defined as 'gruntSqueals') could be used in pig welfare assessment.



The dominant frequency of different calls, including 'grunts', 'squeals' and these 'gruntsqueals' are included and we can see from

this representation that 'gruntsqueals' dominant frequency is intermediate, somehow transitory between 'grunts' and 'squeals'.

A main and direct outcome from these observations is that studies using vocalizations to assess animal welfare should focus, not only on high-pitched calls (negative valence with high arousal), but also on lower pitched ones, that could as well indicate a negative valence state with lower arousal. By giving importance to such lower frequency calls, one could prevent the animals from experiencing a transition from 'negative valence and low arousal' to 'negative valence and high arousal'. Keeping a low level negative valence (vs high level negative) could already be a major achievement in implementing better housing conditions and breeding programs.

4) Future collaboration with host institution (if applicable)

As mentioned in the project proposal and above, this study was the necessary foundation for a longer-term collaborative project aiming at identifying which can be the subtle morphological changes related to the domestication process, in relation with the production and expression of vocalizations in wild boars. While some interesting and useful results are already foreseable, this project is still at its primary stage and will last for two years, during which the host and the Exchange visit grant trustee will work together.

5) Projected publications / articles resulting or to result from the grant *(ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant)*

One publication detailing the compostition of wild boars vocal repertoire is planned once the analysis will be completed (publication expected within 8 months to a year from the end of the study).

Eventually, the current study will serve a long-term project between the three institutions (MNHN & INRA, France – CogBio, Austria) and the ESF will then be acknowledged accordingly.

6) Other comments (if any)

The results of the present study will be presented at the European Conference on Behavioural Ecology (ECBB2014), being held in Prague from July 17th to July 20th.

I am truly grateful to Dr. Yann Locatelli (host researcher), who introduced me to personal from INRA (Unit 'Physiologie de la Reproduction et du Comportement') with whom he works.

We could also discuss about long-term collaboration, possibly concerning the time by which my PhD will be completed.

Finally, I would like to thank the ESF for this Exchange visit grant. I would also like to thank Prof. W. Tecumseh Fitch, director of the Cognitive Biology Department, University of Vienna, whose university grant covered the costs that exceeded the amount provided by the ESF grant.