REPLY TO DEMATTEO *ET AL*

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DeMatteo *et al* (pp 343–348, this issue) express concerns about the dataset and analyses we used in an earlier study (De Vleeschouwer *et al* 2000) to question the reversibility of melengestrol acetate (MGA) implants in golden-headed lion tamarins (GHLT). The authors also raise a number of minor issues on data presentation, certain parts of the discussion and misinterpretation of the data presented in DeMatteo (1997) which, however, have no potential impact on the validity of our conclusions. We therefore restrict our reply to concerns regarding the validity of our dataset and analyses, which we consider largely unjustified.

De Matteo *et al* consider it inappropriate to include data on implants that have not been removed, in the absence of endocrinological data indicating whether the implants are still effective. We investigated reversibility by starting our analyses two years after the date of insertion of the MGA implant, on the basis of the Contraceptive Advisory Group's (CAG) recommendation that MGA implants be replaced after two years. Because this time point is an approximation of the duration of implant efficacy, we considered it a minimum 'lower margin' beyond which implants might have expired. This may be less accurate than the consideration only of animals that have had their implants removed; however, we do believe that data on reproduction in females with potentially expired implants can hold important clues about reversibility. If females are fully capable of resuming reproduction, but expiry time varies between implants, one would expect to see a gradual increase in the number of females resuming breeding as the time since implantation of the contraceptive increases. Our data show no such pattern. Out of 19 females that had had implants in place for at least two years, only three resumed breeding. Births occurred within a short interval after the assumed expiry date (24, 28 and 29 months after implantation). Nevertheless, for 16 females with potentially expired implants but no return to fertility, the time since implantation ranged from 32 to 53 months (n = 16; p 260, De Vleeschouwer *et al* 2000). We consider this range large enough to reveal a gradual increase in the number of females resuming breeding, if such an increase had been present. The only explanation we can see for the absence of such a pattern is either that most implants are active for much longer than two years (ie an efficacy of a minimum of three years and perhaps up to five years), or that there is a reversibility problem and females do not resume breeding after their implant has expired. Because very few females resumed breeding after having had their implants removed (two out of seven females), we considered that reversibility problems are more likely to explain most of the low reversibility we observed.

Regarding their argument that we did not allow females enough time to resume breeding after their implants were removed, DeMatteo *et al* are at least partially wrong about the identity of the animals that they presume to be included in our analyses. Our data set was

larger than the CAG's and some of the implants in our analyses are not included in the CAG report (DeMatteo 1997). Data collection for our paper ended in December 1997 (p 253, De Vleeschouwer *et al* 2000). Particularly, the three Antwerp females that DeMatteo *et al* mention (p 344, this issue) were *not* included in our analyses. Indeed, their implants were removed at the end of May 1999 and the paper was submitted on June 23 1999, which left less than a month to evaluate reversibility. As a normal pregnancy lasts for four months, we never considered including these females in our analyses. Although this is not explicitly mentioned in the original paper, we assessed reversibility *only* if the time after implant removal was at least four months. For the five females that had had their implants removed but did not resume reproduction, the time elapsed since implant removal ranged from 10.5 to 83.0 months. We consider this sufficiently long to raise doubts about the females' capability of reproducing again.

DeMatteo *et al* further consider the data presented for these females inadequate for evaluating reversibility because no information is presented on social group variables that could influence the females' ability to conceive. We disagree on this point. The survey we used for data collection (see Appendix in De Vleeschouwer *et al* 2000) contained questions on changes in social status, mate access, group composition and occurrence of sexual interactions during and after the time of implantation. Similar questions are included in the CAG's annual survey, but a number of additional questions included in our survey provided us with more detailed information than the CAG's survey. DeMatteo *et al* specifically mention two factors which might have affected the females' ability to conceive: presence of fertile males, and dominance status.

All 26 females for which we assessed reversibility were housed in groups in which they were the only female or the formerly breeding female, and in which at least one adult male was present. One case involved a daughter in her natal group (this animal was implanted because she had bred in her group). Sixteen of these females were housed with males with whom they (n = 11) or another female (n = 5) had formerly bred. It is theoretically possible, although to us it seems highly unlikely, that all females would have accidentally been paired with infertile males or previously fertile males that became infertile.

The possibility of changes in dominance status was also addressed in our survey. Zoos cannot always provide data on changes in dominance relationships, as this requires detailed observations. Yet, most zoos indicated that they thought no changes in dominance relationships had occurred. In Callitrichidae, a change in dominance relationships between females is usually abundantly clear because another female assumes breeding status. There was no increased rate of breeding by formerly non-reproductive females in any of the study groups.

Thus, all females were housed under conditions in which conception could have occurred. We therefore consider our analyses, both on potentially expired implants and on removed implants, valid, and we maintain our conclusion that there is a problem with reversibility of MGA implants in GHLT.

References

DeMatteo K 1997 *AZA Contraception Advisory Group Contraception Report. Part I: Primates. 1st Edition.* Saint Louis Zoological Park: Saint Louis, MO, USA

De Vleeschouwer K, Leus K and Van Elsacker L 2000 An evaluation of the suitability of contraceptive methods in golden-headed lion tamarins (*Leontopithecus chrysomelas*), with emphasis on melengestrol acetate (MGA) implants. 1. Effectiveness, reversibility and medical side-effects. *Animal Welfare 9*: 251-271