RHSP Reproductive Health Surveillance Program

HOW AN OLD UTERUS CAN HELP A YOUNG ONE

The Role of Reproductive Pathology in Sustainability

by Anneke Moresco and Dalen W Agnew

Fertile animals are essential for the sustainability of breeding programs and safe contraception is key to managing a breeding program by controlling reproduction temporarily in well-represented individuals. However, extended periods of contraception can affect long-term fertility. The **Reproductive Health Surveillance Program** has evolved over the 25 years since its inception. Originally started by Dr. Munson to specifically monitor the adverse effects of contraception in zoo animals, we now examine the effects of additional factors like age and other reproductive management practices, like separating genders, on the development of lesions in the reproductive tract (reproductive pathology) that would affect reproduction.

Why reproductive pathology?

The study of reproductive pathology allows us to evaluate the effect of certain management practices (separation, breeding, contraception) on fertility. However, in order to carry out those studies we rely on tissues and history from animals that have passed away or who have been spayed or castrated. The RHSP then evaluates the association of specific risk factors (such as age, contraception, breeding, etc), to the occurrence of certain lesions (such as cancer, hyperplasia, inflammation etc.). These associations allow the Reproductive Management Center (RMC) to update recommendations on which contraceptive or other breeding practice is the preferred method for certain species.

In animals that have not been exposed to contraception, this research allows us to identify the common lesions to help avoid them or to treat them by altering management practices..

STATS IN A FLASH

- **>25** Years of data
- **> 3,000** Archived repro tracts
- **> 350** Species
- **190** Zoos (2 Aquaria) participate
- **16** Universities participate
- **> 40** Publications
- Ideal for comparative research
- Archive is available to colleagues for collaborative projects

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Jaguars and Ovarian Cancer

The RHSP has worked with PhD candidate Dr. Sarah Corner at Michigan State University, the Jaguar SSP, and multiple AZA institutions to investigate the genetic basis for ovarian cancer in jaguars. Photo: A. Moresco.

Reproductive Pathology in Suidae and Tayassuidae

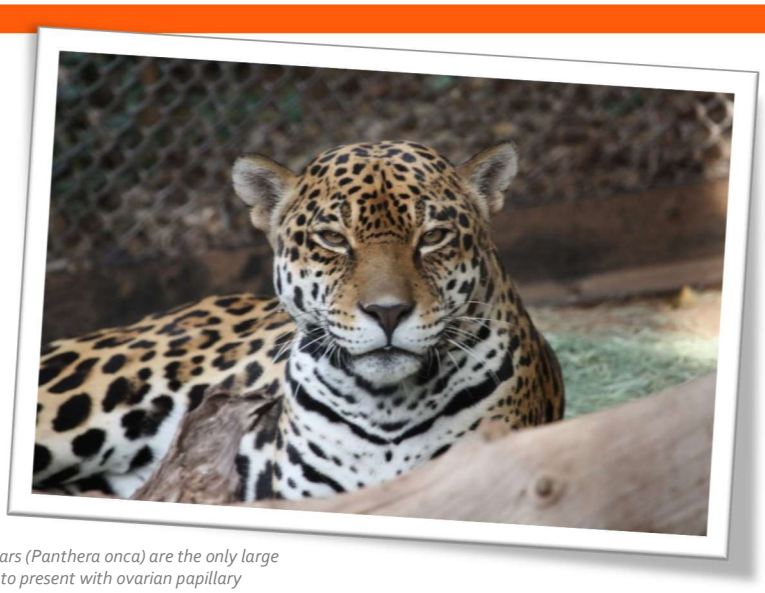
The RHSP collaborated with Dr. Annie Newell-Fugate on a project funded by AAZV's Wild Animal Health Fund to evaluate the reproductive pathology in suids and tayassuids. This project exemplifies the power of collaboration: Texas A&M, RHSP, Wild Pig, TAG, various SSPs and numerous institutions. Photo: A. Moresco.

Jaguar Ovarian and Mammary Gland Cancer

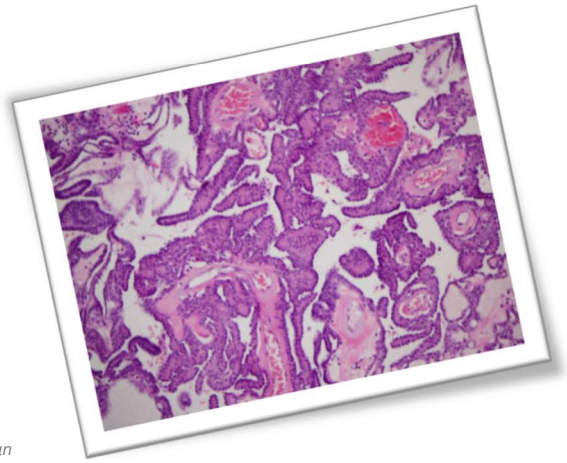
Jaguars are the only large cat in which ovarian papillary cystadenocarcinomas have been documented. Dr. Sarah Corner's study included all jaguars in the RHSP database and live jaguars for which we could obtain blood samples (total 72 females and 20 males). The study showed that the study population had a 40% prevalence of ovarian carcinoma (many of these were bilateral) and 25% had mammary carcinoma. One third of the jaguars with ovarian carcinoma (7/22) traced back to the same breeding pair. By sequencing 300 genes a lot of baseline data was generated for future research. Dr. Corner found that the genetic diversity of the AZA population (North America) is similar to that in the wild.

How does this help management? The cancer tends to show up in older females and the use of progestin contraception (MGA) was not associated with the occurrence of the ovarian cancer. So as long as females are bred early in life, reproduction is unlikely to be affected. Additional research is needed to define the best way to breed the jaguar population while minimizing the chances of passing on heritable factors.

The tissues Dr. Corner used from the RHSP archive spanned multiple generations of jaguars. Without the archive in place, a similar analysis would have taken over 25 years to complete. This demonstrates why it is valuable to archive tissues on a regular basis, so that material is available for study when pressing research needs are identified.



Jaguars (Panthera onca) are the only large felid to present with ovarian papillary cystadenocarcinomas. Photo: A. Moresco.



Micrograph of an ovarian adenocarcinoma in a jaguar. Photo: S. Corner.

Suids and Tayassuids

This project is the perfect example of collaborative work. Dr. Annie Newell-Fugate is the reproductive advisor for the Wild Pig, Peccary and Hippo TAG. Dr. Newell-Fugate approached the RHSP about a retrospective study to evaluate the reproductive pathology in suids and tayassuids. At the onset of the study the archive only contained 29 reproductive tracts. A grant was obtained from AAZV to cover the costs of acquiring additional cases. After collaboration with the San Diego Zoo, the Bronx Zoo, the Brookfield Zoo and NorthWest Zoopath, a total of 145 female tracts were added to the archive database. The results indicated that Babirusa and Warthogs have a high prevalence of uterine pathology (91%; n=11 and 90%; n= 31 respectively). There appears to be an association of pathology with nulliparity and that endometrial hyperplasia can progress to carcinoma. These findings are important because they can guide the direction of lifetime reproductive planning for a specific female. Additionally, knowing that they are at high risk for uterine pathology may direct more detailed diagnostics of the uterus in younger females and as the animal ages.

Warthogs (Phacochoerus africanus) have a high prevalence of uterine pathology. Photo: A. Moresco

Drs. Anneke Moresco and Dalen Agnew have been Co-directors of the RHSP since 2009. In order to carry out this important work, the RHSP requires ongoing financial support to process, maintain, and study the tissue archives and grow the database. Currently it is funded only by intermittent grants, dwindling academic support, and volunteer work.