

REPRODUCTIVE CHECKLIST TO ASSESS FERTILITY

This tool was originally developed by the AZA Reproductive Management Center in 2014 as part of an RMC-sponsored workshop on diagnosis, treatment and prevention of infertility in zoo animals. The RMC later shared this worksheet with EAZA's Reproductive Management Group and the two groups codeveloped it further. The goal of this worksheet is to stimulate conversation and fact-finding in cases of presumed infertility in zoo and aquarium animals that have been given the opportunity to breed but have not successfully produced offspring despite those opportunities. While not a diagnostic tool itself, this questionnaire should be useful in prioritizing resources for diagnosis and remediation of cases of presumed infertility. The questionnaire should be completed for each individual in a pair.

GENERAL

**IS THIS APPLICABLE? IF SO, DO
YOU HAVE THE INFORMATION?**

Species' Reproductive Biology

	YES	NO	N/A
1. Is the species seasonal in terms of breeding?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. What is the normal age of sexual maturity for the species in males and females?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. What is the age of reproductive senescence for the species in males and females?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. What is the species' mating system/reproductive strategy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. What is the typical litter size of the species?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Individual History

1. Age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Number of facility transfers to date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Did this animal come from another country or a non-AZA/EAZA facility?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Describe the rearing history of this individual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. If the individual was hand-reared:			
a. Is this individual imprinted on humans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Does this individual demonstrate normal sex-specific reproductive and social behavior?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. What is the individual's demeanor/temperament?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Is this compatible with their potential mate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is there a history of aggression towards potential mates?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Individual Health

	YES	NO	N/A
1. Weight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Body condition score	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Vaccination and deworming history	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Does the animal have any chronic conditions? Could any of these interfere with normal reproductive processes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Has it received any of the following treatments?			
a. Assisted Reproductive Technologies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Glucocorticoid treatments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. COX2 treatments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Contraception?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. When was this animal's last routine health exam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Were the external genitalia normal?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Does it have any skeletal abnormalities? Could any of these interfere with normal reproductive processes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Has an infectious disease screening been carried out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Does this individual have any known congenital abnormalities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Individual Reproductive History

	YES	NO	N/A
1. Has this individual produced offspring previously? Provide dates.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. What was the age of first reproduction for this individual?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Has this animal had a breeding soundness/reproductive exam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. If so, what were the findings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Is there a history of reproductive disease?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Has this animal had advanced imaging (ultrasound, CT w/CE) of the reproductive tract? If so, what were the findings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. When this animal appears to be ready to breed, how much and what kind of access does it have to potential mates?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Have appropriate reproductive behaviors been observed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Copulation dates?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. What other reproductive behaviors have been observed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. On what dates was the reproductive behaviors in (b) observed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. What types of breeding have been attempted in the past (natural vs. artificial)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. If behavior has been appropriately monitored, has the animal been observed refusing to mate? If so, when?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. If hormone analyses have been conducted to assess reproductive function, what were the results?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. If applicable, has this individual demonstrated normal species-specific parental care previously?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Has this individual shown evidence of killing or otherwise harming offspring?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Does the animal have a record of producing offspring that are stunted or show any congenital abnormalities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Does the animal have a record of producing offspring who suffered neonatal deaths?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Are there any necropsy data from neonatal death/placentas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Husbandry

YES NO N/A

1. Is the diet species-specific and nutritionally sound?
 - a. Is it fed on a natural feeding cycle? This could mean carcass fed, intermittent feeding (e.g. 'fast days'), seasonal changes in diet, or other practices meant to approximate natural dietary dynamics.
 - b. Is the animal fed supplements? Concentrates?
2. What is the enrichment this animal is given?
3. Do any potential stressors appear to be impacting the animal? For example:
 - a. Presence of predators?
 - b. Social stress?
 - c. Stress from the public?
4. Is the animal in a single or mixed-species exhibit?
5. Does the animal have indoor/outdoor access?
6. Does the animal have access to UVB lighting, if needed?
7. Does the animals have access to heat source, if needed?
8. Is a natural light cycle being simulated?
9. Does the animal have access to a nest box, if needed?
10. Are hiding/escape areas provided?
11. What substrates does it have?
12. Does the enclosure have the appropriate humidity conditions?
13. Are the right environmental cues to induce mating/courtship provided?

Social Considerations

1. What is the typical social group for this species in the wild?
2. Does the social structure the target animal(s) live(s) in resemble natural history?
 - a. Solitary, paired, grouped, harem, multi-male, multi-female?
3. How long has this individual been in its current social group?
4. What conspecifics are housed with the individual?
5. Has this individual typically lived in species-appropriate social groups?
6. Where is this individual in the group's hierarchy, if relevant?
7. Have new individuals been introduced recently that may have caused social disruption or may have introduced a pathogen?
8. If relevant, is the social unit the animal lives in generally compatible or are social issues like atypical levels of aggression present?

FEMALES

Natural History

YES NO N/A

1. How long is the estrous cycle for this species?
 - a. How long are females receptive to mating during the estrous cycle?
 - b. What are the signs of receptivity?
 - c. Has this female demonstrated receptivity? If so, when?
2. Are females of this species induced or spontaneous ovulators? Both?
3. What is the normal inter-estrous interval?
4. What is the normal inter-birth interval for this species?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Individual Reproductive History

1. Has ovulation been confirmed in this female? If so, how and when?
2. Does the female have a record of spontaneous abortion?
 - a. Are there any necropsy data for aborted fetuses?
3. Does she have a history of dystocia?
4. Does she have a history of stillbirths?
5. How are pregnancy and parturition monitored and diagnosed in this individual?
6. Does she have a history of false pregnancies?
7. What is the length of her inter-birth interval?
8. Have this female's previous litters been of typical size for the species?
9. What is the female's lactational history (i.e. has she lactated normally or experienced complications or insufficient lactation)?
10. Has she ever suffered from mastitis?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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MALES

Natural History

1. Do we know what the normal range of testosterone concentrations is in breeding males of this species?
2. Do we know what normal semen characteristics look like in this species?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Individual Reproductive History

1. Is this male a proven breeder? If so, when?
2. Has this male had a formal fertility assessment with semen analysis?
 - a. If so, what were the results?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>