GSAR Journal of Agriculture and Veterinary Sciences
ISSN: 3048-9075 (Online)
Abbreviated key title: Glob.J. Agri.Vet.Sci.
Frequency: Monthly
Published By GSAR Publishers
Journal Homepage Link- https://gsarpublishers.com/journal-gjavs-home/

Behavioural patterns and reproductive challenges of captive and wild Chinese giant pandas, *Ailuropoda melanoleuca,* David 1869 (Mammalia: Ursidae): threats and conservation insights

BY

Mamata Rani Das[1], Ashraful Kabir[2*]

[1]Department of Natural History, Bangladesh National Museum, Shahbag, Dhaka—1000
[2]Department of Biology, Cantonment Public College, Saidpur Cantonment—5311, Nilphamari, Bangladesh

Article History

Received: 10/02/2025
Accepted: 20/02/2025
Published: 22/02/2025

Vol – 2 Issue – 2

PP: -46-49

Abstract

Since giant pandas have instinct underweight and underdeveloped cubs, caring of cubs for their survival, this write-up carries a conservation impact. An umbrella reviewing with adequate research works suggested that both in captivity and wild, Chinese giant pandas (Ailuropoda melanoleuca) are capable of surviving while it requires extra care after giving birth with some additional nutritional feed with their common diet. Beijing Zoo of China is continuing significant events for the welfare of these pandas (Fig. 1).

Keywords: *Giant panda, Behaviour, Captive breeding, Survive, Bamboo, Predator*

INTRODUCTION

The giant panda is one of the most well-known and iconic conservation species in the world (Wei et al, 2012). Giant pandas are the endemic animal in China. It includes three types of pandas—giant panda, red panda, Qinling panda. Gulf-Times China (2024) mentioned 1864 giant pandas in China, rest of the countries their numbers are few. Zoos maintain giant pandas for education, exhibition, and breeding (Wei et al, 2006, 2012). To overcome the behavioural incompatibility between sexes, artificial insemination was successfully developed and is now routine work at Chinese breeding centers as well (Wei et al, 2012). Artificial insemination enhances 30% of their overall production. Protected areas have been the cornerstone for their global conservation (Rodrigues et al, 2004). Captive breeding is good for protect animals especially from extinction. The expenditure to set-up captive breeding is higher. It is needed to establish self-sufficient captive population for successful captive breeding. Sometimes, captive animals cannot cope with wild animals after reintroduction due to some behavioural changes. Captive breeding was first observed 10,000 years ago and Egypt was the recognized country in this perspective. China has 67 protected areas for panda habitat. Warm climate and adequate rainfall of China are suitable for bamboo production. Giant pandas are known as umbrella species because in their habitat, some other animals like multi-coloured pheasant, dwarf blue sheep, crested ibis, takin, golden snub-nosed monkey can live without threats of other animals. In captivity, 90% male and 50% female panda showed their successful mating and capable to mate in wild as well (Zhang et al, 2021). A report found that the mortality rate of male panda cub is 26% and female 20% (Rubenstein, 2012). In nature, 20% of the adult panda have ability to mate and mortality was as high as 48% (Xie and Gipps, 1999). There are 50% twins observed in giant pandas. Cub-swapping approach to care twin is effective from past 15 years. The objective of this study is to observe the survival features of Chinese giant pandas both of captivity and wild for their conservation.

Fig. 1. Giant panda (*Ailuropoda melanoleuca*) in Beijing Zoo

*Corresponding Author: **Ashraful Kabir.**

Features of giant pandas: Black-white colour of giant pandas is important to protect them in nature as well as to find out their mates. Their eye-pupils are vertical which are suitable for night vision than bears. They can swim and climb very well. To focus on research to their overall behavioural fitness and personality characteristics are noteworthy (Zhang et al, 2004; Peng et al, 2007; Martin-Wintle et al, 2015, 2017). Of 50% captive female giant pandas are successfully competent to mate in nature (Zhang et al, 2021).

Feed and supplements for giant pandas: Giant pandas are carnivorous animal but they like to eat bamboos (99%) (shoot, root, leaf). It requires 12-38 kg bamboo daily. Since, bamboo is not good for sufficient nutrients but its shoot is enough for their protein requirement. In spring and summer, they eat the shoot of bamboo, leaves in autumn and root in winter. They eat different types of bamboos depending on seasonal production but arrow bamboo (*Pseudosasa japonica*), water/lucky bamboo (*Dracaena sanderiana*), and black/purple bamboo (*Phyllostachys nigra*) are the main edible species. Pumpkin, kidney bean, wheat, domestic pig feed, apple, carrot, eggs, carrion are their feed also. Sometimes, they hunt pikas and small rodents. Supplemented sugar, salt, calcium, and some vitamins are important to mix with the dairy milk in captivity (Peng et al, 2001).

Noticed threats: This mammal is becoming decrease due to large-scale habitat loss and fragmentation, poaching, zoo collection, and massive bamboo harvesting (Zhu et al, 2013). Livestock grazing can lead to a significant reduction of bamboo biomass which lead to threat of giant pandas (Li et al, 2017; Wang et al, 2019; Hull et al, 2014). This is rare to poach or kill of giant pandas but sometimes these animals are trapped with musk deer and black bears. Due to tourism and harvesting of bamboos for business, panda habitats are isolated into subpopulations. Except humans for adult pandas, snow leopard, yellow-throated marten, and jackal are responsible to threat for panda cubs (Figs. 2-4). There are 35 types of endoparasites found within giant pandas (Li et al, 2020).

Fig. 2. Snow leopard

Fig. 3 Yellow-throated marten

Fig. 4. Jackal

Breeding strategies: Hu et al, (1985) reported sexual dimorphism in adult giant pandas with the body weight of males (117.8±15.2 kg) generally 10-20% heavier than that of females (98.8±11.3 kg). The growth rate of the artificially fed cubs was slightly higher than that of the cubs fed by their mothers (Peng et al, 2001). It is also difficult to bred in captivity because of the low fecundity rate and high cub mortality (Hu, 1988). Low birth weight of cubs and their underdeveloped organs at birth are the major cause for their high mortality. Newborn cubs are very small, and weighed mostly 90-131 g (average 104.2 g) (Hu et al, 1985; Lie et al, 1994; Ma et al, 1994). Most of the mothers which give birth to a single cub breast-fed their cubs. In the case of twins, mothers usually only fed one cub and abandoned the other for lack of breast milk (Peng et al, 2001). Most of the cubs that suckled their mothers' milk were healthy but cubs that were fed cow's milk often fell ill and died (Li et al, 1999). Free mate choice and mating behaviour cannot be expressed fully in captivity (Zhang et al, 2004; Martin-Wintle et al, 2015, 2018). Male-male competition during the mating season is very important of wild giant pandas (Nie et al, 2012). The mating period is very short, mainly 2-3 days and sometimes few hours as well. Adult female giant pandas mainly invest in childcare, while adult male pandas invest in mating (Trivers, 1972). A successful captive breeding program requires not only a large population but also ample genetic variation to act as a genetic resource (Shan et al, 2014).

CONCLUSIONS

This is urgent to establish a national park solely on giant panda (*Ailuropoda melanoleuca*). Therefore, any national park will be more effective than zoos for reducing inbreeding depression. Since, the mortality rate of panda cub seemingly high, so need to provide hand feeding of such cubs with vitamin supplements. Behavioural changes due to birth in captivity, sometimes they cannot cope with wild pandas. To overcome this type of problem, behavioural studies need to be widened.

Table 1. Features of giant pandas with sources

Features	Examples	References
Historical background	Egypt has a first record on captive breeding of animals	Wei et al, 2006, 2012
Availability	Except China, there are few giant pandas in the world	Gulf-Times China, 2024
Behaviour	Behavioural studies are important to protect pandas	Zhang et al, 2004; Peng et al, 2007; Martin-Wintle et al, 2015, 2017; Zhang et al, 2021
Protected areas	Need to establish more protected areas for giant pandas	Rodrigues et al, 2004
Feed and supplements	Bamboo is the main feed for giant pandas	Peng et al, 2001
Breeding strategies	Captive breeding is suitable for giant pandas	Trivers, 1972; Hu et al, 1985; Hu, 1988; Lie et al, 1994; Ma et al., 1994; Li et al, 1999; Xie and Gipps, 1999; Peng et al, 2001;

*Corresponding Author: **Ashraful Kabir.**

		Zhang et al, 2004; Nie et al, 2012; Rubenstein, 2012; Shan et al, 2014; Martin-Wintle et al, 2015, 2018
Possible threats	Only human is the dominant predator for adult panda, and snow leopard, jackal, and yellow-throated martens are threats to cubs	Zhu et al, 2013; Hull et al, 2014; Li et al, 2017; Wang et al, 2019

REFERENCES

1. Golden jackal. https://commons.wikimedia.org/wiki/File:Golden_jackal_Corbett.jpg
2. Gulf-Times China. 2024. https://worldpopulationreview.com/country-rankings/giant-panda-population-by-country
3. Hu, J. 1988. Study on the reproductive ecology of the giant panda (in Chinese). *Journal of Nanchong Teachers College* 9(2): 79-83.
4. Hu, J., Shaller, G. B., Pan, W., Zhu, J. 1985. Wolong's giant panda (in Chinese). Chengdu: *Sichuan Publishing House of Science & Technology*.
5. Hull, V., Zhang, J., Zhou, S., Huang, J., Vina, A., Liu, W., Tuanmu, M, -N., Li, R., Liu, D., Xu, W. et al. 2014. Impact of livestock on giant pandas and their habitat. *Journal of Natural Conservation* 22: 256-264.
6. Li, B. V., Pimm, S. L., Li, S., Zhao, L., Luo, C. 2017. Free-ranging livestock threaten the long-term survival of giant pandas. *Biological Conservation* 216: 18-25.
7. Li, J., Karim, M. R., Li, J., Zhang, L., Zhang, L. 2020. Review on parasites of wild and captive giant pandas (*Ailuropoda melanoleuca*): diversity, disease and conservation impact. *International Journal for Parasitology: Parasites and Wildlife* 13: 38-45.
8. Li, D., Zhang, H., Cheng, M., Zhang, G., Wang, P., Xiong, Y. 1999. A preliminary study on raising up the survival rate of artificial breeding giant panda (in Chinese). *Acta Theriologica Sinica* 19(4): 317-319.
9. Liu, W., Xie, Z., Liu, Z., Wang, C., Feng, Y., Zhang, X. 1994. A study of hand-rearing of newborn giant panda (in Chinese). In: *Minutes of the International Symposium on the Protection of the Giant Panda*, Chengdu, China: 164-172. Zhang, A. & He, Z. (eds). Chengdu: *Sichuan Publishing House of Science & Technology*.
10. Ma, Y., Hu, J., Zhai, Q. 1994. Bears of China (in Chinese). *Chengdu: Publishing House of Science & Technology.*
11. Martin-Wintle, M. S., Shepherdson, D., Zhang, G. Q., Huang, Y., Luo, B., Swaisgood, R. R. 2017. Do opposites attract? Effects of personality matching in breeding pairs of captive giant pandas on reproductive success. *Biological Conservation* 207: 27-37.
12. Martin-Wintle, M. S., Shepherdson, D., Zhang, G. Q., Zhang, H. M., Li, D. S., Zhou, X. P., Li, R. G., Swaisgood, R. R. 2015. Free mate choice enhances conservation breeding in the endangered giant panda. *Nature Communications* 6: 10125.
13. Martin-Wintle, M. S., Wintle, N. J. P., Diez-Leon, M., Swaisgood, R. R., Asa, C. S. 2018. Improving the sustainability of *ex situ* populations with mate choice. *Zoo Biology* 38(1): 119-132.
14. Nie, Y. G., Swaisgood, R. R., Zhang, Z. J., Liu, X. B., Wei, F. W. 2012. Reproductive competition and fecal testosterone in wild male giant pandas (*Ailuropoda melanoleuca*). *Behavioral Ecology and Sociobiology* 66: 721-730.
15. Peng, J. J., Jiang, Z. G., Qin, G. Y., Huang, Q. C., Li, Y. X., Jiao, Z., Zhang, F. Q., Li, Z. W., Zhang, J. G., Lu, Y. P., Liu, X. F., Liu, J. P. 2007. Impact of activity space on the reproductive behaviour of giant panda (*Ailuropoda melanoleuca*) in captivity. *Applied Animal Behaviour Science* 104: 151-161.
16. Peng, J., Jiang, Z., Liu, W., Huang, S., Zhang, J., Wang, W. 2001. Growth and development of giant panda (*Ailuropoda melanoleuca*) cubs at Beijing Zoo. *The Zoological Society of London* 254: 261-266.
17. Rodrigues, A. S. L., Andelman, S. J., Bakarr, L., Brooks, T. M., Cowling, R. M., Fishpool, L. D. C., Da Fonseca, G. A. B., Gaston, K. J., Hoffmann, M. *et al.* 2004. Effectiveness of the global protected area network in representing species diversity. *Nature* 428: 640-643.
18. Rubenstein, D. M. 2012. Giant panda cub at National Zoo died as result of lung and liver damage. Smithsonian's National Zoo & Conservation Biology Institute. https://nationalzoo.si.edu/news/giant-panda-cub-national-zoo-died-result-lung-and-liver-damage
19. Shan, L., Hu, Y., Zhu, L., Yan, L., Wang, C., Li, D., Jin, X., Zhang, C., Wei, F. 2014. Large-scale genetic survey provides insights into the captive management and reintroduction of giant pandas. *Molecular Biology and Evolution* 31(10): 2663-2671.
20. Snow leopard. https://www.wallpaperflare.com/snow-leopard-walking-on-white-snow-field-during-daytime-close-up-photography-wallpaper-zzvnj
21. Trivers, R. 1972. Parental investment and sexual selection. In: *Campbell, B. (Ed)., Sexual Selection*

*Corresponding Author: **Ashraful Kabir.**

and the Descent of Man. Aldine de Gruyter, New York, pp. 136-179.

22. Wang, X., Huang, J., Connor, T. A., Bai, W., Zhang, J., Wei, W., Zhang, Z., Liu, D., Zhou, C. 2019. Impact of livestock grazing on biodiversity and giant panda habitat. *Journal of Wildlife Management* 83: 1592-1597.
23. Wei, F. W., Hu, Y. B., Zhu, L. F., Bruford, M. W., Zhan, X. J., Zhang, L. 2012. Black and white and read all over the past, present and future of giant panda genetics. *Molecular Ecology* 21: 5660-5674.
24. Wei, F. W., Zhang, Z. H., Zhang, Z. J. 2006. History, current situation and future of *in-situ* and *ex-situ* conservation of the giant panda. In: *Zhang, Z. H., Wei, F. W., editors. Giant panda ex-situ conservation: theory and practice.* Beijing: Science Press, p. 13-42.
25. Xie, Z. and Gipps, J. 1999. The 1999 international studbook for giant panda. Beijing: Chinese Association of Zoological Gardens.
26. Yellow-throated marten. https://animalia.bio/yellow-throated-marten/1000
27. Zhang, G. Q., Swaisgood, R. R., Zhang, H. M. 2004. Evaluation of behavioral factors influencing reproductive success and failure in captive giant pandas. *Zoo Biology* 23: 15-31.
28. Zhang, M-y., Zhang, X-h., Zhang, P., Liu, Y-l., An, J-h., Wang, D-h., Cai, Z-g, Hou, R. 2021. Natural reproductive performance is associated with captive management in adult male giant pandas. *Applied Animal Behaviour Science* 240: 1-9.
29. Zhu, L. F., Hu, Y. B., Qi, D. W., Wu, H., Zhan, X. J., Zhang, Z. J., Bruford, M. W., Wang, J. L., Yang, X. Y., Gu, X. D. *et al.* 2013. Genetic consequences of historical anthropogenic and ecological events on giant pandas. *Ecology* 94: 2346-2357.

s

*Corresponding Author: **Ashraful Kabir.**