

MODEL DEVELOPMENT TO PREDICT THE BEST AGE FOR THE GENETIC SELECTION FOR THE GROWTH IN MAHA MAGUR

Adithya Bindhu Sreekumar^{1,2,3*}, Shrinivas Jahageerdar³, Shamna Naseemashahul⁴, Jayasankar Jayaraman⁵, and Appavoo Dhandapani⁶

¹Gulf Coast Aquatic Health Lab, Global Center for Aquatic Health and Food Security, Gautier, MS, USA, 39553; ²Department of Pathobiology and Population Medicine, College of Veterinary Medicine, Mississippi State University, Starkville, MS, USA, 39762; ³Division of Fish Genetics and Biotechnology, ICAR-Central Institute of Fisheries Education, Mumbai, MR, India, 400061; ⁴Division of Fish Nutrition, Biochemistry and Physiology, ICAR-Central Institute of Fisheries Education, Mumbai, MR, India, 400061; ⁵Division of Fishery Resources Assessment, ICAR-Central Marine Fisheries Research Institute, Kochi, KL, India, 682018; ⁶Division of Information and Communication Management, ICAR-National Academy of Agricultural Research Management, Hyderabad, TS, India, 500030

*Email: ab5127@msstate.edu

Introduction

- Maha magur is the genetically improved Indian freshwater catfish *Clarias magur*. The ICAR-Central Institute of Fisheries Education, Mumbai, initiated the first genetic improvement program of *Clarias magur* in 2013 to improve the body weight at harvest (360 days).
- In the present study, the best age for genetic selection was identified to increase the genetic gain of Maha magur.
- The development of a predictive model for identifying the best age for genetic selection holds immense promise in optimizing resource management and contributing to the sustainable development of fish farming practices.

Materials and Methods

- A total of 7908 fish with 20,393 observations of body weight belonging to 5 generations were collected from the breeding records available in the Freshwater Fish Farm, Balabhadrapuram, India, and compiled and used in this study.
- The primary and secondary traits studied are body weight and the daily weight gain, respectively.
- Kernel's Density Estimates were generated by using univariate and bivariate models.
- Spline regression models were developed for overall and generation-wise to understand where the growth rate starts declining.

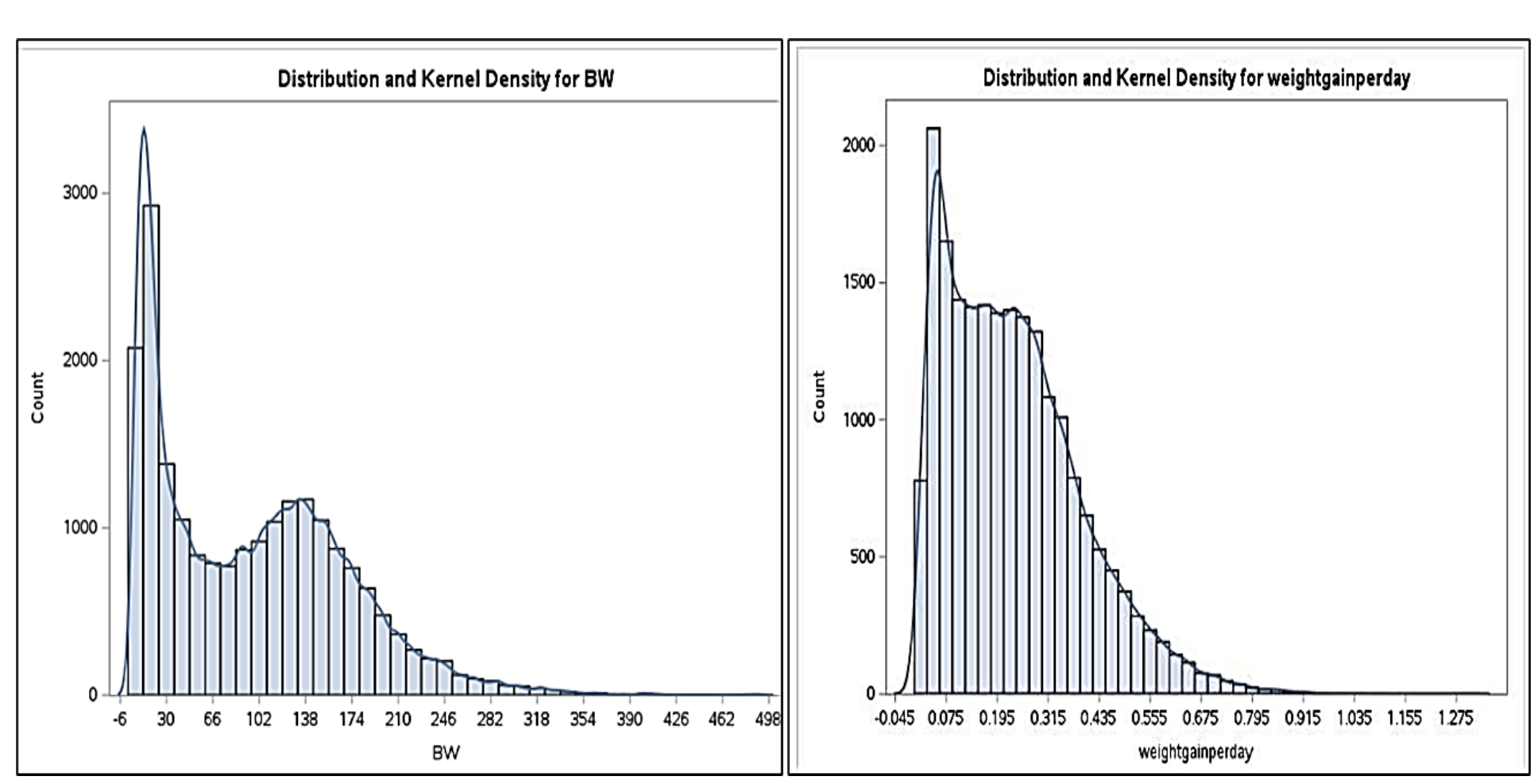


Fig. 1. Estimated Kernel distribution of body weight distribution and daily weight gain across all generations.

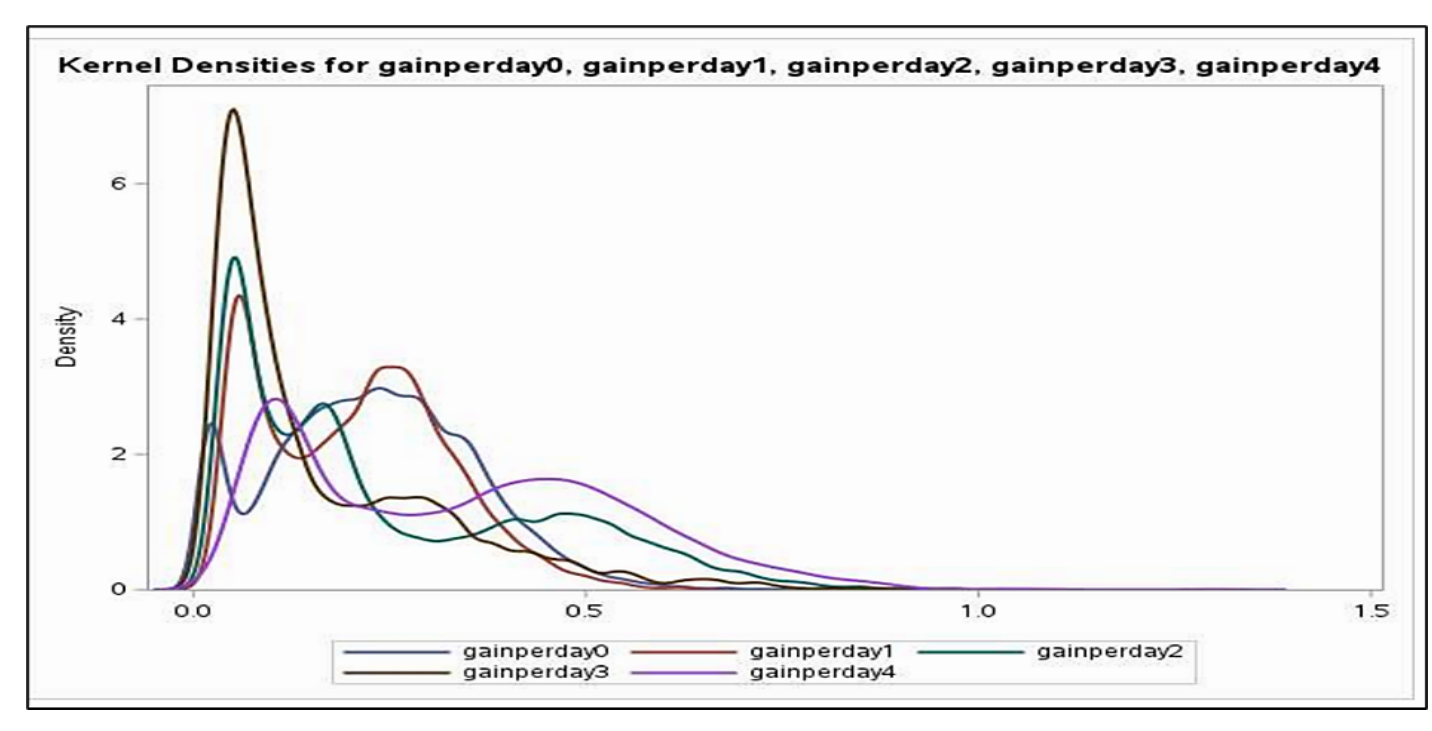


Fig. 2. Kernel density estimates for daily weight gain (Generation-wise)

Results and Discussion

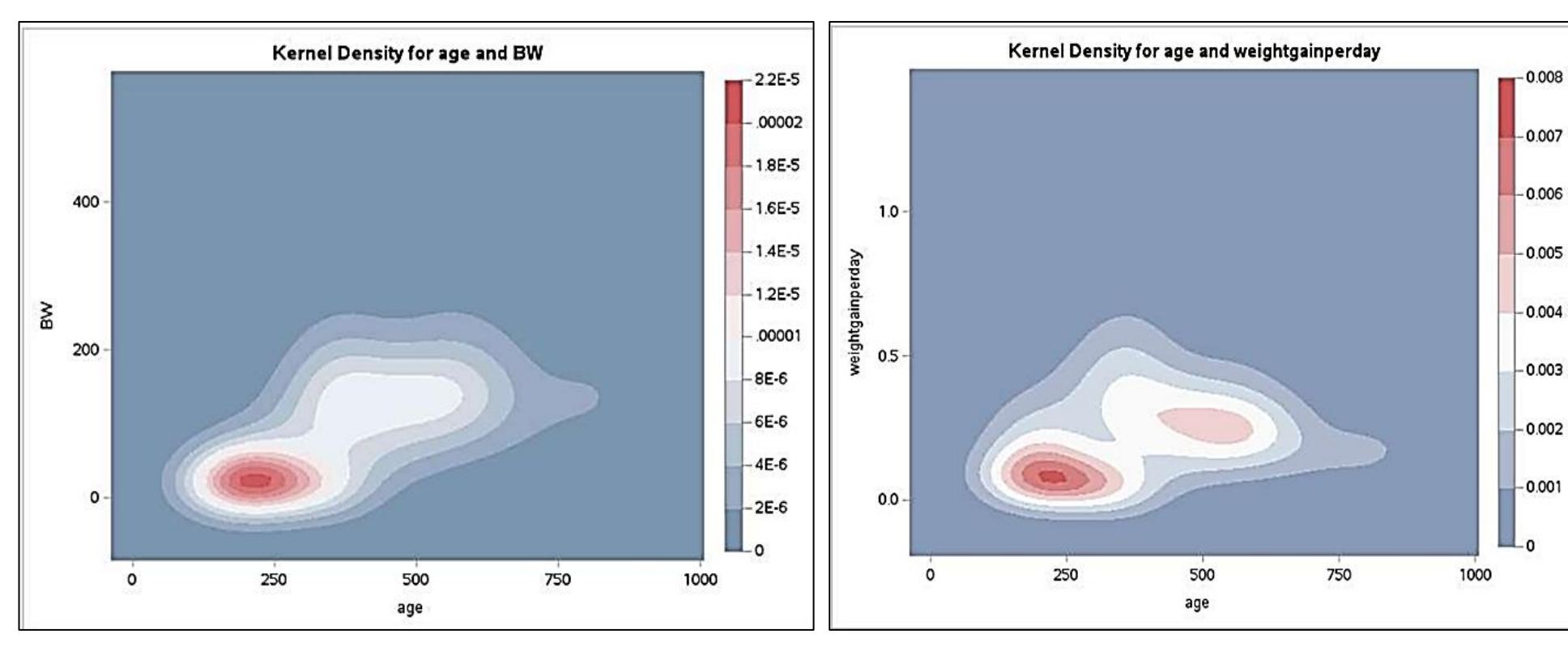


Fig. 3. Contour plots of estimated joint probability density functions of BW and age, daily weight gain and age across all generations.

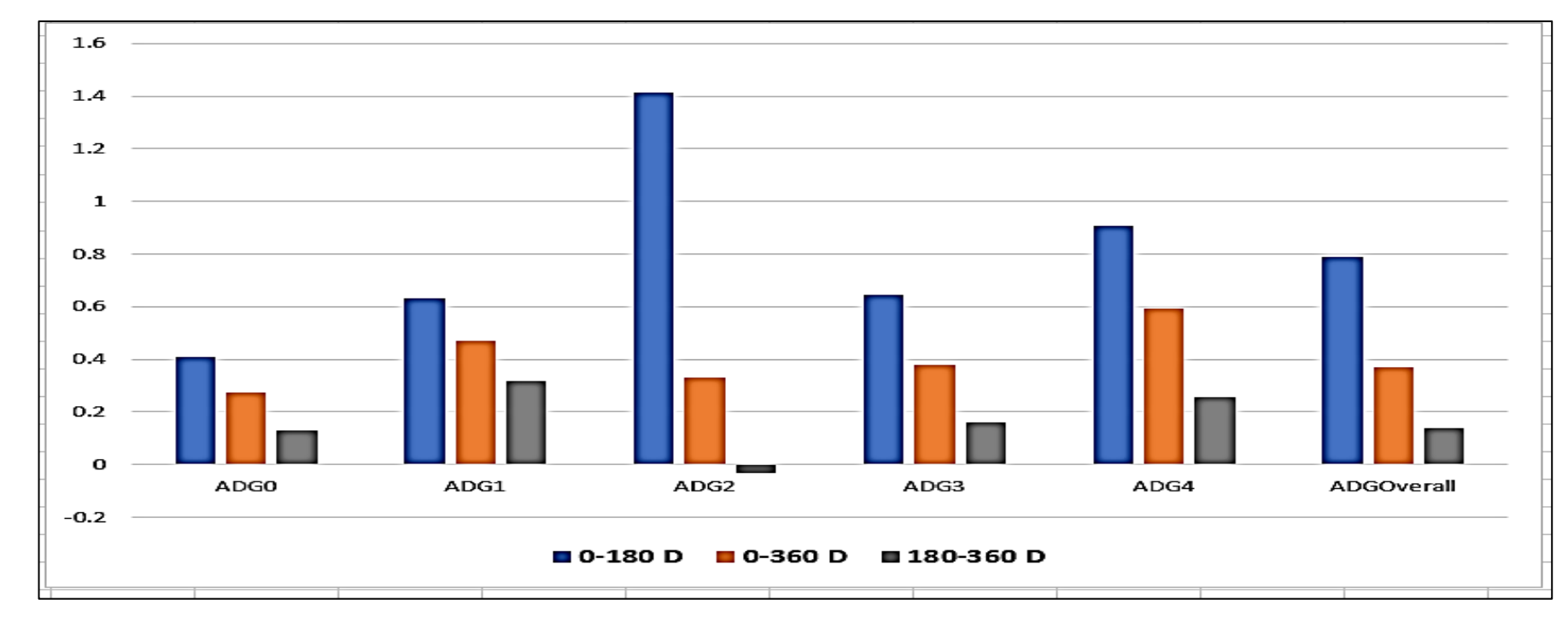


Fig. 4. The ADG between 0-180, 0-360, and 180-360 days of the culture period (Generation-wise and overall).

- The spline regression showed that the daily weight gain started declining after 180 days of culture.
- The heritability of body weight at 180 and 360 days of culture was similar (0.61 ± 0.05).
- Rameez (2021) showed the variation in heritability in magur during the 180-724 days of age. Heritability showed a declining trend as the age advanced.
- The heritability of daily weight gain was higher from stocking to 180 days (0.52 ± 0.06) than from 180-360 days of culture (0.32 ± 0.05).
- The genetic and phenotypic correlations between body weight at 180 and 360 days were high.

Conclusion

This study may be concluded that the genetic selection of Maha magur can be carried out based on the body weight at 180 days of culture period, thereby it helps to reduce the generation interval and also maintain a similar magnitude of response to selection.

References

- Jousy, N., Jahageerdar, S., Prasad, J. K., Babu, P. G. and Krishna, G., 2018. Body weight at harvest and its heritability estimate in *Clarias magur* (Hamilton, 1822) reared under mono and polyculture systems. *Indian Journal of Fisheries*, 65(2): 82-88.
- Meyer, K., 2005. Random regression analyses using B-splines to model growth of Australian Angus cattle. *Genetics Selection Evolution*, 37, 1-28.
- Rameez R., 2021. Evaluating alternate models to estimate genetic parameters of economic traits in *Clarias magur*. Ph.D. Thesis, ICAR-CIFE, Mumbai. ISBN: 978-81-951963-4-0

Acknowledgements

This study formed part of the Master's program of the first author, and she acknowledges the financial support received as a fellowship from ICAR, India. The authors thank the ICAR-CIFE Director for providing the funds and infrastructure for this study. We thank the OIC, technical, and supporting staff of FWFF, CIFE, Balabhadrapuram. The first author thanks the MSU-CVM Department of Pathobiology and Population Medicine, the Department Head, and GCAHFS for supporting her travel funds for attending this conference.