

1. **Full name of the faculty member:** Dr. Aruna Pal
2. **Designation:** : Associate Professor (Animal Genetics & Breeding), Livestock Farm Complex & Former, In-Charge Livestock Farm, West Bengal University of Animal and Fishery Sciences, Kolkata-700037, India.

Orchid id: <https://orcid.org/0000-0001-5681-2065>

3. **Specialisation:** Animal Genetics and Breeding with specialization in Molecular genetics, immunogenetics, mitochondrial genomics
4. **Contact information:** Phone: +91-8910673989 e-mail ID:arunachatterjee@gmail.com
5. **Academic qualifications:**

College/ university from which the degree was obtained	Abbreviation of the degree
Indian Veterinary Research Institute, Izatnagar, Bareilly	PhD
National Dairy Research Institute	M.V.Sc
West Bengal University of Animal and Fishery Sciences	B.V.Sc& AH

6. Positions held/ holding or Work Experience:

- i. Associate Professor, WBUAFS: 3.01.2024 till date
- ii. Assistant Professor, WBUAFS: 09.07.2013 to 02.01.2024
- iii. Scientist C, Department of Biotechnology, Ministry of Science and Technology, Govt. of India: 03.01.2012 to 08.07.2013
- iv. InCharge Quality Control Laboratory, Frozen Semen Bull station/ Veterinary Officer: 12.04.2006 to 02.01.2012

7. Awards:

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| 2025 | Best Poster presentation Award, SVBBICON 2025 |
| 2024 | International Fellow, ICMR (Senior Biomedical Scientist)- US. |
| 2023 | Fellow, SOCDAB |
| 2020 | Indo-US Genome Engineering and Technology Initiative , GETin Fellow 2020 by Indo-US Science and Technology Forum (IUSSTF), New Delhi, funded by DBT, Ministry of Science and Technology, Govt. of India at University of Alabama, Birmingham, US |
| 2023 | Outstanding Paper presentation Award , awarded by Department of Higher Education, Science and Technology and Biotechnology, Govt. of West Bengal |
| 2022 | Pushkar Nath Bhat National Award for Animal Genetics & Breeding , conferred by Society for Animal Genetics and Breeding |
| 2022 | Best Oral Presentation Award-2022 , National Conference on “Innovations in Animal Genetics & Breeding for sustainable productivity of Livestock and Poultry” |
| 2022 | Best Poster Presentation Award-2022 , National Conference on “Innovations in Animal Genetics & Breeding for sustainable productivity of Livestock and Poultry” |
| 2020 | Best Oral presentation Award, 2020 , awarded by Department of Higher Education, Science and Technology and Biotechnology, Govt. of West Bengal |
| 2019 | Best Oral Presentation Award-Regional Science Congress , Bardhaman University, organized by Department of Higher Education, Science and Technology and Biotechnology, Govt. of West Bengal |
| 2019 | Best Oral Presentation Award- ANACON , West Bengal University of Animal and Fishery Sciences |
| 2017 | “Certificate of Commendation” - awarded by Department of Higher Education, Science and Technology and Biotechnology, Govt. of West Bengal |
| 2017 | Best Poster presentation Award by SOCDAB in National Symposium at Kerala Veterinary College, Mannuthy |
| 2018 | Best Oral presentation Award awarded by IMSACON, at WBUAFS, Kolkata “Innovations in Muscle Food processing for Nutritional Security, quality and safety. |
| 2018 | Best Oral presentation Award awarded by ANACON, 2018 at Bihar Animal Science University, Patna “XI th Biennial Conference of Animal Nutrition Association on the Theme, “Reorienting Animal Nutrition Research in the Perspective of Farmer’s Welfare. |
| 2016 | “Outstanding Paper presentation Award” awarded by Department of Science and Technology, Govt. of West Bengal at Regional Science Congress, Presidency Division, West Bengal |
| 2016 | Best Oral presentation Award by SOCDAB in National Symposium on “Policy Planning for Livelihood security through Domestic Animal Biodiversity” |
| 2016 | Best Oral Presentation Award (ANSICON) |

2015	Best poster presentation Award in <i>International Symposium on Sustainable management of Animal Genetic resources for Livelihood security in Developing countries</i> conferred by SOCDAB (Society for Conservation of Domestic Animal Biodiversity) Head Quarter: NBAGR, Karnal
2015	Best Poster presentation award - by GLANCE
2014	Best Poster Award - International Conference on Reproductive Health: Issues & Strategies under changing Climate Scenario conferred by Indian Society for the study of Reproduction and Fertility
2014	DBT-BIOCARE Award,
2003-2006	IVRI-SRF, 2001-2003, ICAR-JRF, 1995-2000, Merit Scholarship conferred by WBUAFS

8. Other notable activities:

RESEARCH PROJECTS: : (PI: 04, CO-PI : 06)

As PI:

DBT (Govt. of India) funded project on “**Study of Disease Resistance Genes and Molecular Characterization of Indigenous Sheep in West Bengal**” (Completed)

DST –SERB (Govt. of India) funded project on “**Molecular Characterization of indigenous ducks and study of its innate immunity particularly avian influenza**” (completed)

DBT (Govt. of India) funded project-Duck Consortium-on “**Integrated Approach to explore and exploit the Innate and Adaptive immune response in Indigenous Duck Breeds of North Eastern, Eastern and South India**” (completed)

DBT (Govt. of India) funded project- **Development of gene edited chicken resistant to avian influenza for safe human health and studying chicken/duck model for host resistance against influenza in human** (Ongoing)

LEADERSHIP ROLE:

- **Head of the Department**, Department of Livestock Farm Complex, West Bengal University of Animal and Fishery Sciences.(2021-2023)
- Convenor, **Human Genetics and Genomics** Task Force, Medical Biotechnology, **Department of Biotechnology**, Ministry of Science and Technology, Govt. of India (2012-2013).
- Executive member for the Society for Conservation of Domestic Animal Biodiversity, Karnal (SOCDAB) for the years as 2015-17, 2017-19, 2026-till date
- In-Charge, Animal Genomics Laboratory (erstwhile Animal Biotechnology Unit), WBUAFS. Infrastructure Development: Established Animal Genomics Laboratory, WBUAFS (2014- Till date)
- In-Charge, Quality Control Lab, Frozen Semen Bull Station, Salboni, Paschim Medinipur, West Bengal, India (2006-2007).
- In-Charge, Block Animal Health Centre, Dubrajpur Development block, Birbhum, West Bengal, India (2007-2012)

STUDENTS GUIDANCE:

PhD students :

Dr. Samiddha Banerjee, Subhomoy Pal, Dr. Kavita Rawat, Dr. Sankar Biswas, Dr. Manti Debnath, Argha Chakraborty, Dr. Durgadas Mondal, Dr. Shehnaz , Dr. Debopritam, Dr. Amrita Tah

M.V.Sc /M.F.Sc Students:

Dr. Meenakshi Pradhan, Dr. Thounaojam Nabakumar Singh, Dr. Achinto Mahato, Dr. Md. Tousif Zaman Khan, Dr. Tripti, Dr. Md. Mofizul, Dr. Anuj Murmu, Dr. Ajantika Ghosh, Dr. Jyoti Sahu, Mandira, Pratyaii, Sougata

INTERNATIONAL THESIS EXAMINER:

PhD Thesis (Roll no 01/2012(Reg. No. 14054/Session 1985-86)), Bangladesh Agricultural University, Mymensingh, Bangladesh.

PROFESSIONAL MEMBERSHIP FOR SCIENTIFIC SOCIETIES : 10

1. Life Member: Indian Society for the study of Reproduction and Fertility. Membership id.1160.
2. Life Member: Indian Society for Animal Genetics and Breeding. Membership id: ISAGB/619/593
3. Life Member: Indian Association of Animal Production, Membership id: 186
4. Member: Indian Association for advancement of Veterinary Research
5. Life Member: Society for conservation of Domestic Animal Biodiversity. Life membership id:777/2014
6. Life Member: Society for Veterinary Science and Biotechnology, Membership id: 166/SVSVT/2017
7. Life Member: Indian Science Congress Association Membership id: AH28
8. Life Member: West Bengal Veterinary Council
9. Member: Board of studies, Indian Veterinary Research Institute, Izatnagar, U.P. (Year 2004)
10. Life Member: Member of Society for Mitochondrial Research and Medicine (SMRM).

9. Publication:

Research paper in Journals (National & International):with NAAS, IF rating

1. Tah A, **Pal A**, Chatterjee PN, De D, Mahato A, Chakraborty A, Debnath M and Roy S (2025) Dietary supplementation with nano-zinc modulates the expression of the antiviral immune gene IRF3: a novel report. *Front. Immunol.* 16:1583956. doi: 10.3389/fimmu.2025.1583956. **NAAS, IF: 11.90**
2. **Pal, A.**, Pal, Ab., Banerjee, S., Batobyal, S. and Chatterjee, P.N. 2019. Mutation in *Cytochrome B gene* causes debility and adverse effects on *health* of sheep. *Mitochondrion* 46 : 393-404. <https://doi.org/10.1016/j.mito.2018.10.003>. **NAAS, IF: 10.50**
3. **Pal, A**, Pal, A. Jr., Mallick, A.I., Biswas, P. and Chatterjee, P.N. 2019. Molecular characterization of *Bu- 1 and TLR2* gene in Haringhata Black chicken. *Genomics* 112(1): 472-483. <https://doi.org/10.1016/j.ygeno.2019.03.010> **NAAS, IF: 9.00**
4. Banerjee S, **Pal, A.**, Mandal, S.C., Chatterjee, P. N., Chatterjee, J.K. 2021. RIG-I has a role in *immunity* against *Haemonchus contortus*, a gastrointestinal parasite in *Ovis aries*- a novel report. *Frontiers in immunology*. 08 January 2021 <https://doi.org/10.3389/fimmu.2020.534705>. **NAAS, IF: 11.90**
5. Pradhan, M., **Pal, A.**, Samanta, A.K., Banerjee, S., Samanta, R. 2018. Mutations in *cytochrome B gene* effects female reproduction of Ghungroo pig. *Theriogenology*. 119: 121-130. doi: 10.1016/j.theriogenology.2018.05.015. **NAAS, IF: 8.5**
6. **Pal, Aruna.**, Pal, Abantika and Chakravarty, A.K. 2018. Mutations in Growth hormone gene affect stability of protein structure leading to reduced growth, reproduction and milk production in Cross Bred cattle- an insight. *Domestic Animal Endocrinology*. <https://doi.org/10.1016/j.domaniend.2019.106405> **NAAS, IF: 8.10**
7. **Pal, A.**, Pal, Ab., Baviskar, P. 2021. Molecular characterization of RIGI, TLR7 and TLR3 as immune response gene of indigenous ducks in response to Avian influenza. doi: <https://doi.org/10.3389/fmolb.2021.633283> (Frontier Molecular BioScience) **NAAS, IF: 10.00**
8. Rawat, K., **Pal, A.**, Banerjee, S., Pal, Ab., Mandal, S.C., Batobyal, S. 2021. Ovine CD14- an immune response gene has a role against gastrointestinal nematode *Haemonchus contortus* -a novel report. *Frontiers in Immunology*. <https://doi.org/10.3389/fimmu.2021.664877>. **NAAS, IF: 11.90**
9. Islam, M, **Pal, A. et al.**, 2020. Better expression profile of CD8 and CD4 gene in uterus of pregnant ewe in comparison to non-pregnant - a novel report. <https://doi.org/10.1101/2020.10.07.329730>
10. Pal, Ab., **Pal, A.** 2020. A new insight to the innate immune response with respect to SARS-Cov2 (Covid 19) virus. (BIORXIV/2020/334730)
11. Pal, Ab., **Pal, A.** 2020. Wide variabilities identified among spike proteins of SARS Cov2 globally-dominant variant identified. <https://doi.org/10.1101/2020.09.26.314385>
12. Banerjee, S, **Pal, A.** et al., 2020. Role of NUMT in disease occurrence and immunity. BIORXIV/2020/326355.
13. Debnath, M., Pal, A., Chakraborty, A., Pal, S., Pal, Ab. 2022. Genomics for reproduction in *Anas platyrhynchos*-a novel report. doi: <https://doi.org/10.1101/2022.05.29.493861>
14. Murmu, A.K., Pal, A., et al., 2023. Role of mucin gene for growth in *Anas platyrhynchos* - a novel report. *Frontiers Veterinary science*. doi **10.3389/fvets.2023.1089451**. **NAAS, IF: 8.90**

15. Pal, S., Pal, A. et al., 2022. Role of RIGI, MDA5 and interferon alpha of duck in Duck Plague infection – a novel report. doi: <https://doi.org/10.1101/2022.01.26.477779>
16. Pal,A., Chakraborty, A., Debnath,M. 2022. Whole mitochondrial genome sequencing- a novel approach for studying Phylogenomics for *Anas platyrhynchos*. doi: <https://doi.org/10.1101/2022.07.11.499548>
17. Pal,A., Chakraborty, A., Debnath,M. 2022. Molecular evolution and characterization of domestic duck (*Anas platyrhynchos*) and Goose (*Anser indicus*) with reference to its wild relatives through whole mitochondrial genome sequencing .doi: <https://doi.org/10.1101/2022.07.19.500621>
18. Pal, A., Banerjee, S., Pathak, K., Das, M.K., Chatterjee, P.N. 2022. Molecular phylogenetic analysis for *Ovis aries* with whole mitochondrial genome sequencing. doi. <https://doi.org/10.1101/2022.07.29.502105>
19. Pal, A., Banerjee,S., Karmakar,P.2022. Phylophenomic and Phylogenomic analysis for *Ovis aries* reveals distinct identity of newly reported breed. doi: <https://doi.org/10.1101/2022.07.31.502249>
20. Sahu, J. Pal, A et al., 2023. Role of NUMTs (Nuclear mitochondrial DNA) genes in affecting disease resistance in duck against Pasteurellosis. bioRxiv preprint doi: <https://doi.org/10.1101/2023.08.30.555528>;
21. Chakraborty,A. Pal, A. 2023. Mitochondrial genes affect the immune response against bacterial infection (Duck Pasteurellosis) through a cascade of mechanisms mediated by nuclear immune genes- a cross talk with nuclear and mitochondrial gene. bioRxiv preprint doi: <https://doi.org/10.1101/2023.08.30.555483>
22. Rawat, K. Pal, A et al., 2023. Role of IL-6 and IL10 immune response genes against nematode *Haemonchus contortus* in ovis aries- a novel report. bioRxiv preprint doi: <https://doi.org/10.1101/2023.08.30.555538>
23. Banerjee,S., Pal,A., Pal,Ab., Chatterjee, J.K.2023. Ovine MyD88 have active role in host resistance against *Haemonchus contortus* infection. doi: <https://doi.org/10.1101/2023.10.08.561398>
24. Pal, Aruna and Debnath, Manti and Chatterjee, Pares Nath.2023. Metagenomic Profiling for Gut of Indigenous Poultry Reared Under Free Range System of Management Reveal Prevalence of Zoonotic Pathogens in Chicken, While Predominating Beneficial Microbes in Duck. Available at <http://dx.doi.org/10.2139/ssrn.4555282>
25. Pal,A.etal.,2022. Mutations in CD14 gene causes mastitis in different breeds of buffalo as confirmed by in silico studiesand experimental validation .DOI:10.21203/rs.2.10779/v1
26. Pal,A., Chakravarty,A.K.,and Chatterjee,P.N. 2014. Polymorphism of Growth hormone geneanditsassociation with seminal and sexual behavioral traits in crossbred cattle.Theriogenology. 81:474-480. doi: 10.1016/j.theriogenology.2013.11.002.**NAAS, IF: 8.5**
27. Pal,A., Chakravarty,A.K.,andChatterjee,P.N. 2012. Genetic study of dairy cattle and buffalo bulls basedon growth, milk productionand reproductive traits. IranianJ.ofAppliedAnimalScience.2(3):239-245
28. Pal,A.,Sharma, A., Bhattacharya, T.K.,Chatterjee,P.N.and Chakravarty, A.K.2011. Molecular = characterizationand SNPdetectionofCD 14geneincrossbred cattle.MolecularBiologyInternational,vol.2011,Article ID 507346, 13 pages, 2011.doi:10.4061/2011/507346
29. Pal,A., Chakravarty, A.K.,Bhattacharya, T.K.,andSharma,A. 2005. Polymorphism of growth hormonegeneanditsassociation withexpected milk production traits in dairy bulls. J. of Applied Animal research. 27(9):29-33. <https://doi.org/10.1080/09712119.2005.9706532>. **NAAS, IF: 7.9**
30. Pal,A., Chakravarty, A.K.,Bhattacharya, T.K.,Joshi,B.K.andSharma,A.2004. Detection of Polymorphism of growth hormonegene for the analysis of relationship between allele type and growth traits in Karan Fries cattle. AsianAust.J.AnimalSci.17(9):1334-1337.DOI: 10.5713/ajas.2004.1334.**NAAS, IF: 8.50**
31. Mahato A,ChatterjeePN,Sarkar S, Sen AR,Pal A, Roy S,Patra AK. 2024. Effects of Chemicallyand GreenSynthesized ZincOxide Nanoparticleson Shelf Life andSensory Quality ofMinced Fish(*Pangasiushypophthalmus*).Foods. 2024; 13(17):2810.<https://doi.org/10.3390/foods13172810>.**NAAS, IF: 11.10**
32. Pal, A. and Chatterjee, P.N. 2009. Molecular cloning and characterization of CD14 gene in goat. *J. of Small Ruminant Research*. 82: 84-87.**NAAS, IF: 7.40**
33. Pal, A. and Chatterjee, P.N.2010. Molecular characterization of growth hormone gene in riverine buffaloes. *Buffalo Bulletin*. 29(4): 279-290**NAAS, IF:6.20**
34. Pal, A., Chatterjee, P.N. and Sharma, A. 2013. Molecular evolution and structural analysis of Caprine CD14 deduced from cDNA clones. *Indian J. of Animal Science*. 83:10, 1062-1067
35. Datta, S., Verma, A., Pal, A. and Chatterjee, P.N. 2014. Molecular characterization of Leptin gene in riverine buffaloes. *Buffalo Bulletin*. 32:3, 196-211.**NAAS, IF:6.20**

36. **Pal, A.**, Chatterjee, P.N., and Sharma, A. 2014. Sequence characterization and polymorphism detection in bubaline CD14 gene. **Buffalo Bulletin**. 32:2, 138-156 **NAAS, IF:6.20**
37. **Pal, A.** and Chatterjee, P.N. 2014. Field level Study on the Buffalo Bullock: An excellent Draught Animal. **Buffalo Bulletin**. 32:3, 218-231. **NAAS, IF:6.20**
38. Pal, A., Chatterjee, P.N., Das, S., Batobyal, S., Biswas, P. and Sharma, A. 2017. Biodiversity among sheep and goat reared under different agroclimatic regions of West Bengal, India. **Indian Journal of Animal Science**, 87 (1): 80-86. **NAAS, IF:6.3**
39. Pal, A. and Banerjee, S. 2018. Mitochondrial replacement therapy-a new remedy for defects in reproduction. **Indian Journal of Animal Sciences** 88 (6): 637–644. **NAAS, IF:6.3**
40. T.K. Manna., Samanta, A.K., **Pal, A.**, Lal B. K., Samanta, R., Chatterjee, P.N. and Bera, S. 2016. Black Bengal goat serve as a source of income and insurance against disaster in the Sunderban region of West Bengal. **Indian Journal of Animal Production and Management**. 31(3-4), 76-79. **NAAS, IF:2.51**
41. Pal, A., Chatterjee, P.N., Biswas, P., Soren, A., Vohra, V. and Sharma. 2016. Evaluation of draughtability in Hool buffalo of Birbhum (West Bengal), **J. of Livestock Biodiversity**, 6 (2): 56-59. **NAAS, IF:2.97**

Popular/ Review Articles:

1. **Pal (Chatterjee), A.** and Chatterjee, P.N. 2007. Breeding strategy for improvement of cattle and Buffalo in the context of West Bengal. Invited paper in the National seminar on "Doorstep delivery of Artificial Insemination to ensure Cattle and Buffalo Development", Feb, 2007. p. 134-141.
2. **Pal (Chatterjee), A.** and Chatterjee, P.N. 2007. Selection of bulls for quality semen production , improved libido, fertility and milk yield. Invited paper in the National seminar on "Doorstep delivery of Artificial Insemination to ensure Cattle and Buffalo Development". Feb, 2007. p. 142-148.
3. **Pal, A.**, Chatterjee, P.N., Bhowmik, N.D., Karmakar, U.K. and Biswas, P. 2011. Goat and Sheep - A pride for the poor: Strategies for its conservation and upgradation in the context of West Bengal. Technical Session of 41st ReUnion of W.B. Univ. of Animal & Fishery Sci., Kolkata.
4. Chatterjee, P.N., Biswas, P., **Pal, A.** and Mondal, A.B. 2011. Ruminant Methanogenesis - A threat for Sustainable Animal Production. Technical Session of 41st ReUnion of W.B. Univ. of Animal & Fishery Sci., Kolkata..
5. **Pal, A.** and Chatterjee, P.N. 2013. Molecular Genetic Approaches for Combating Mastitis. Technical Seminar on Optimization of Livestock Productivity-Key Regulator of Rural Economy. 43rd Veterinary ReUnion of W.B. Univ. of Animal & Fishery Sci., Kolkata.
6. **Pal, A.** and Chatterjee, P.N. 2014. Genetics for disease resistance in farm animals for optimization of Livestock Productivity-Key Regulator of Rural Economy. National Seminar on Disaster management in Livestock Production. 44th Veterinary ReUnion of W.B. Univ. of Animal & Fishery Sci., Kolkata.
7. Pal, A. Chatterjee, P.N. and Biswas, P. 2014. Biodiversity and molecular phylogeny of mammals and avian based on functional genes. Invited paper in the Proceedings of **National Conference on Biodiversity: Issues, Concern and Future Strategies, 2014**", organized by West Bengal Biodiversity Board, Department of Environment, Govt. of West Bengal at Kolkata, 16-18th Feb., 2014
8. Pal, A and Bannerjee, S. 2016. "Nutrigenomics , its scope and application" Compendium , 2016, ICAR-IVRI, ERS, Kolkata. Short term Training Course on Advances in Livestock Production, management Technologies, 23-30th Nov, 2016.
9. Pal, A. 2017. "Marker assisted selection for conservation of indigenous breed of small ruminants" compendium, 2017, ICAR sponsored 10 days Short Course on "Conservation of indigenous breeds of small ruminants in their respective tracts", 18th July to 27th July, 2017.

10. Pal, A. 2017. "Molecular approach for Conservation of indigenous breeds of small ruminants" compendium, 2017, ICAR sponsored 10 days Short Course on "Conservation of indigenous breeds of small ruminants in their respective tracts", 18th July to 27th July, 2017.
15. Pal, A, Batobyal, S. and Chatterjee, P.N. 2017. Immune response genes – a key regulator for disease resistance in livestock"- lead paper in National seminar on Opportunities and Challenges of Translational Research in the Frontier Areas of Animal Biotechnology and V Annual Convention of SVSBT, 22nd-23rdSept, OUAT, Bhubaneswar, 2017 .
12. Aruna Pal and P.N.Chatterjee. 2019. Nutrigenomics- a novel concept in Nutrition. 21 days Summer School, Dept.of Animal Nutrition. WBUAFS
13. Aruna Pal and P.N.Chatterjee. 2019. Real Time or Quantitative PCR- protocol and practical approach.

Books:

1. **Pal, A.** and Chakravarty, A.K. 2019. Genetics & Breeding for the Disease resistance of livestock. Elsevier Publication. Academic publisher. ISBN: 9780128164068
2. Pal, A. 2018. Birbhum sheep-the prolific sheep of West Bengal, Pp: 51. Published by DREF. West Bengal University of Animal and Fishery Sciences, West Bengal, India. ISBN: 978-93-5268-187-7
3. Pal, A. 2021. Protocols in Advanced Genomics and allied techniques., Springer Publication. Springer Protocols Handbooks .ISBN 978-1-0716-1817-2 ISBN 978-1-0716-1818-9 (eBook), <https://doi.org/10.1007/978-1-0716-1818-9>
4. Pal, A. 2020. Bengal duck-The hardy breed of West Bengal, Pp: 55. Published by DREF. West Bengal University of Animal and Fishery Sciences, West Bengal, India.
5. Pal, A, and Singh, KK. 2026. Mitochondrial genomics and mitochondrial dysfunction in diseases. Elsevier Publication. Academic publisher. ISBN: 9780443266553

Book Chapter:

1. Chatterjee, P.N., Mandal, A.B., Hajra, S. and **Pal, A.** 2006. Rumen fungi and their role in Fibre Degradation, IAAVAR. In "Rumenology II". p-88.
2. Pal, A. , Bannerjee, S., and Chatterjee, P.N. 2016. "Nutrigenomics and its impact" Lead paper in the Proceedings of *National Seminar on Food Security and sustainable nutrition in India-the present scenarion, 2016*", organized by , Department of Food and Nutrition, APC College,

West Bengal Sate University, Govt. of West Bengal at Kolkata, 15-16th September, 2016.

ISBN No. 978-93-5268-180-8 .
3. Pal , A et al., 2018. Understanding the molecular mechanism of antiviral resistance of indigenous ducks. Proceedings, National Seminar on 'Biotechnology in Human Health and Environment'

Sponsored by Department of Higher Education, Science & Technology and Biotechnology,

Govt. of West Bengal, held at 23rd March, 2018, Seth Anandram Jaipuria College, Kolkata,

West Bengal, India.
4. **Pal, A.** Pakhira, M., Roy, D. 2015. Instructional Livestock Farm practice diary, LFP-211, LFP-221-

Manual on ILFC practical class-2015
5. Chatterjee, P.N., Roy, B., **Pal, A.**, Mondal, G.P., Soren, S., Biswas, P. 2018. "Studies on Strategic replacement of antibiotic growth promoters for production of safe chicken." Proceedings, National Seminar on 'Biotechnology in Human Health and Environment' Sponsored by Department of Higher Education, Science & Technology

and Biotechnology, Govt. of West Bengal, held at 23rd March, 2018, Seth Anandram Jaipuria College, Kolkata, West Bengal, India.

6. P.N. Chatterjee, Sapath Acharyae & **Aruna Pal**. 2018. Designer eggs for value addition to human dish. In Biotechnology and Nature. Sponsored by The Department of Higher Education, Science & Technology and Biotechnology. Government of West Bengal ISBN 978-93-87602-66-3. Page-181-191.