

वार्षिक प्रतिवेदन
Annual Report
2016 - 2017

AICRP on Poultry Breeding and Poultry Seed Project



Annual Report 2016 - 2017



भाकृअनुप - कुक्कुट अनुसंधान निदेशालय
ICAR - Directorate of Poultry Research

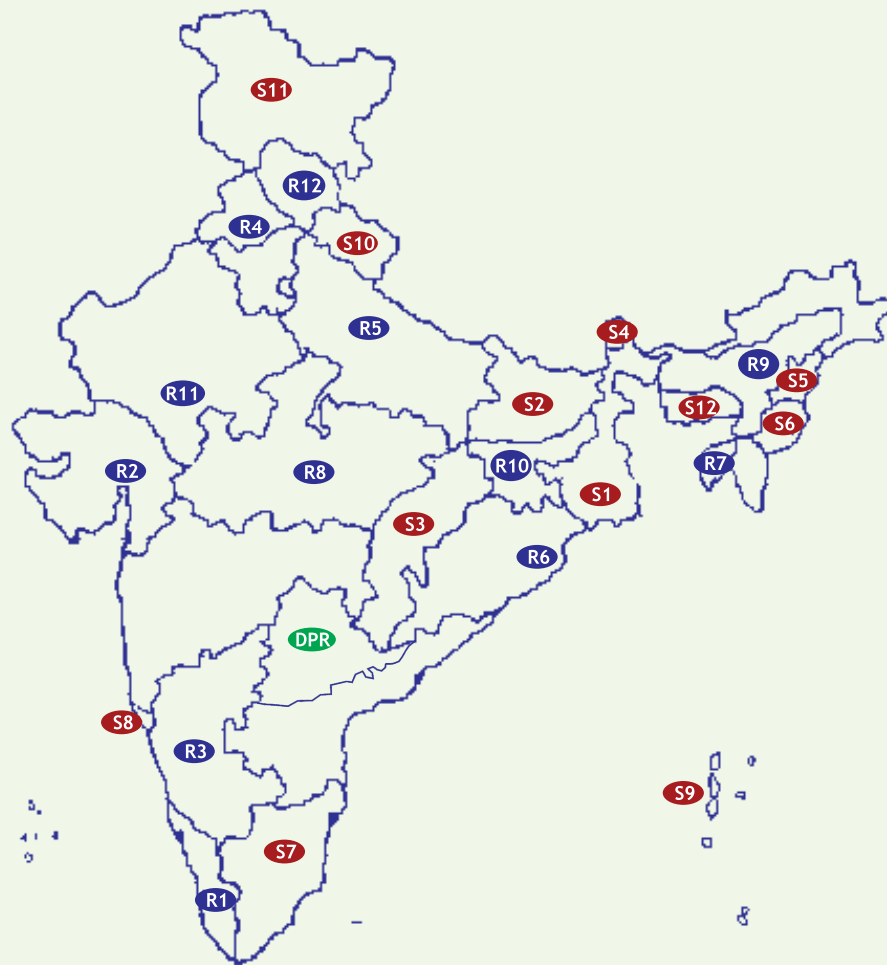
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AICRP on Poultry Breeding and Poultry Seed Project

Centres across the Nation



ICAR - DPR

AICRP Centres

- R1. KVASU, Mannuthy
- R2. AAU, Anand
- R3. KVAFSU, Bengaluru
- R4. GADVASU, Ludhiana
- R5. ICAR-CARI, Izatnagar
- R6. OUAT, Bhubaneswar
- R7. ICAR-RC, Agartala
- R8. NDVSU, Jabalpur
- R9. AAU, Guwahati
- R10. BAU, Ranchi
- R11. MPUAT, Udaipur
- R12. CSKHPKV, Palampur

PSP Centres

- S1. WBUAFS, Kolkata
- S1. BAU, Patna
- S3. CKVV, Durg
- S4. ICAR-NOFRI, Sikkim
- S5. ICAR-RC, Nagaland
- S6. ICAR-RC, Manipur
- S7. TANUVAS, Hosur
- S8. ICAR-CCARI, Goa
- S9. ICAR-CIARI, Port Blair
- S10. ICAR-IVRI, Mukteswar
- S11. SKUAST, Srinagar
- S12. ICAR-RC for NEHR, Barapani (NFC)

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and
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ISO 9001-2008

Rajendranagar, Hyderabad-500 030.

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Back cover

Administrative cum Laboratory building.

Inside back cover

Hon'ble Prof. H. Rehman, DDG (Animal Science), ICAR, New Delhi
releasing *Jharsim* variety for rural poultry at BAU, Ranchi

Preface



The ICAR-Directorate of Poultry Research has completed twenty nine years of dedicated and continued service by fulfilling the mandated responsibilities in improving the poultry production through All India Coordinated Research Project on Poultry Breeding and Poultry Seed Project. I am privileged to present the annual report on AICRP on Poultry Breeding and Poultry Seed Project (PSP) for the year 2016-17. The Directorate is coordinating 12 centres each AICRP and PSP spread across the country. AICRP on Poultry breeding started during IV five year plan which is land mark in the history of poultry breeding research in India. Later, it was upgraded to Project Directorate on Poultry from 1st March, 1988 at Andhra Pradesh Agriculture University, Rajendranagar, Hyderabad. Extensive Research has been carried out in layer and broiler production since inception till 2013-14. The AICRP on Poultry Breeding was reoriented towards Rural Poultry with the objectives of development of location specific rural chicken varieties; conservation, improvement and utilization of locally available indigenous germ plasm and conservation of elite layer & broiler strains developed under the AICRP on Poultry Breeding. Poultry seed project was initiated during XI plan with three centres in main land and three centres in NEH region in order to improve the availability egg and meat in rural areas and further strengthened with addition five more centres during XII plan. In addition, one non-funding centre was also added at ICAR Research Complex, Umiam.

The continuous efforts of scientists of AICRP on Poultry Breeding at different centres resulted in development and release of three layers varieties

(ILI-80, ILM-90, ILR-90) and four broiler varieties (B-77, IBL-80, IBB-83 and IBI-91) for commercial exploitation. In addition, four location specific varieties (*Pratapdhan*, *Kamrupa*, *Narmadanidhi* and *Jharsim*) were developed and released which are widely accepted in their respective region. The AICRP centres supplied 7.11 lakhs of germ plasm. The PSP centres distributed 4.39 lakh improved rural chicken varieties (*Vanaraja* and *Gramapriya*) to the farmers. The work done by the AICRP and PSP centers is highly appreciable.

I place on record my deepest sense of gratitude to Dr. T. Mohapatra, Secretary (DARE) & Director General (ICAR) for his ever inspiring and valuable guidance extended during the period. I am grateful to Secretary, ICAR and Financial Advisor, ICAR for their constant support. I am grateful to Prof. Dr. J. K. Jena, DDG (Animal Science) for his keen interest, support and guidance. for the overall development of the Directorate. I am thankful to Prof. H. Rehman, Ex-DDG (Animal Science) for his continuous support and encouragement in implementing the programmes. I am thankful to Dr. R. S. Gandhi, ADG (AP&B), Dr. Vineet Bhasin, Principal scientist (AGB) and other scientific and Administrative Officials of the ICAR for their help from time to time. The research progress made under AICRP and PSP could not have been possible without the support and sincere contribution of the scientists of AICRP and PSP cell of this Directorate and all the in charges of different centers of AICRP and PSP. I also, thank the other staff for effectively supporting the scientists in their research endeavor. I also thank the editorial committee in bringing out this report in appreciable manner.

(R.N. Chatterjee)

Abbreviations

ASM	Age at sexual maturity in days
BW16	Body weight at 16 weeks of age in g
BW40	Body weight at 40 weeks of age in g
BW64	Body weight at 64 weeks of age in g
BW72	Body weight at 72 weeks of age in g
EP40	Egg production number upto 40 weeks of age
EP64	Egg production number upto 64 weeks of age
EP72	Egg production number upto 72 weeks of age
EW28	Egg weight at 28 weeks of age in g
EW40	Egg weight at 40 week of age in g
EW64	Egg weight at 64 weeks of age in g
EW72	Egg weight at 72 weeks of age i n g
FC	Feed consumption
FCR	Feed conversion ratio
HH	Hen housed
HD	Hen day

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Executive Summary

All India Coordinated Research on Poultry Breeding

AICRP on Poultry Breeding was reoriented towards Rural Poultry from the year 2014-15. At present it is being operated at twelve centres viz. KVASU, Mannuthy, AAU, Anand; KVAFSU, Bengaluru, GADVASU, Ludhiana, OUAT, Bhubaneswar, CARI, Izatnagar, ICAR Research Complex for NEH Region, Agartala, MPPCVVV, Jabalpur, AAU, Guwahati, BAU, Ranchi, MPUAT, Udaipur and CSKHPKV, Palampur. The main objectives of the project was development of location specific chicken varieties; conservation, improvement, characterization and application of local native and elite layer and broiler germplasm and develop package of practices for village poultry and entrepreneurships in rural, tribal and backyard areas. In addition KVASU, Mannuthy and AAU, Anand centres are maintaining two elite layer germplasm (IWN and IWP). KVAFSU, Bengaluru, GADVASU, Ludhiana OUAT, Bhubaneswar, CARI, Izatnagar are maintaining four elite broiler strains (PB-1, PB-2, CSML and CSFL).

Two pedigreed random bred control populations (one for layer and the other for broiler) were evaluated and reproduced at Directorate of Poultry Research, Hyderabad. Samples of hatching eggs from these populations were sent to different centers of the AICRP on Poultry Breeding at the time of regeneration. As per the decision taken by the Council, the strains maintained at different AICRP centers and DPR were duplicated at various AICRP centres to be utilized in case of exigencies and as a resource population by the centre for three and four way crossing. The strains being duplicated at different AICRP centre are IWF at Mannuthy, IWD and IWK at Anand and M1 and M2 at Jabalpur centre (Anand centre developed and evaluated two way and four way crosses in layer).

The KVASU, Mannuthy centre has evaluated the S-1 generation of native chicken germplasm up to 40 weeks of age. Egg production of native chicken germplasm up to 40 weeks of age was 72.08 eggs with average egg weight of 41.77g. Egg production increased by 2.25 eggs but egg weight has come down by 1.88 g in the S-1 generation as compared to previous generation. High fertility (93.99%) and hatchability (98.75 and 90.60% on FES and TES) was observed in S-2 generation. Age at sexual maturity was 156.77 days in S-2 generation. Besides, the centre

evaluated IWN and IWP strains up to 64 weeks of age in S-29 generation along with layer control population. In this generation hen housed egg production up to 64 weeks of age decreased by 1.8 eggs in IWN (254.9) while it remained almost same in IWP (261.2) strain and decreased by 3.5 eggs in control population (174.1) on phenotypic scale as compared to previous generation. Average genetic response for 64 weeks hen housed egg production was 4.77 and 1.65 eggs respectively in IWN and IWP strains during last ten generations (S-20 to S-29). Hen housed egg production up to 72 weeks of age in sample population of IWN (301.2) and IWP (304.1) strains came down by 1.6 and 304.1 eggs respectively. The centre has generated the revenue of Rs. 64.256 lakhs, which was 194.72% of the total expenditure on feed (Rs. 33.00 lakhs). The centre has supplied a total of 136743 number germplasm during the year. There was considerable improvement in revenue generation and germplasm supply of this centre as compared to previous year.

At AAU, Anand, chicks of S-0 generation of native birds, RIR breed, F_1 cross (IWN X Native) and three way cross (F_1 X RIR) were evaluated for production traits up to 40 weeks of age. Egg production up to 40 weeks of age was higher in native chicken (74.1) as compared to RIR (62.6) while body weight and egg weights at 40 weeks of age were higher in RIR breed. S-1 generation of Native and RIR breed and their F_1 and three way crosses were regenerated and evaluated upto 16 wks. Fertility of native chicken (82.69%) was lesser as compared to RIR breed (87.15%). As a whole, fertility in this generation has come down compared to previous generation. However hatchability (FES) was better in native chicken (84.95%) as compared to RIR breed (78.29%). Body weight has improved in S-1 generation both in native and RIR as compared to previous generation. Egg production up to 64 weeks of age was higher in IWN (211.05) than IWP (197.87) strain in S-13 generation. However, it has decreased by 42.1, 45.73 and 36.65 eggs respectively in IWN, IWP and control population on phenotypic scale in S-13 generation over previous generation. Similarly, 72 weeks egg production in IWN (257.9) and IWP (240.5) strains decreased by 36.3 and 34.5 eggs respectively in S-13 generation over preceding generation. Genetic response for egg production up to 64 weeks of age in IWN and IWP strains were 0.43 and 0.776 respectively over last 10 generations. The centre has also evaluated IWD and IWK strains up

to 64 weeks of age in S-5 generation. The centre has generated the revenue of Rs. 26.72 lakhs which was 76.78% of the expenditure on feed cost. This was better compared to previous generation. The centre supplied a total of 39474 germplasm during the present year.

At Bengaluru centre, a total of 1317 day old chicks of local indigenous chicken were housed for evaluation after purification. The average body weight of local native chicken at day one and 8 week were 30.43 and 477.84 g, respectively. The feed efficiency at 0-8 week in local native chicken was 3.10. During the current year, production traits of PB-1, PB-2 and Control lines were evaluated in S-8, S-21 generation respectively. The S-9 and S-22 generations of PB-1 and PB-2, along with control lines were regenerated and evaluated for juvenile traits. A total of 3161, 1953 and 94 good chicks were hatched in PB-1, PB-2 and control populations, respectively. The body weight at 5 week in PB-1, PB-2 and Control lines were 1046.35 ± 2.89 , 1017.89 ± 3.73 and 719.85 ± 15.21 g, respectively. Average selection differential in PB-1 and PB-2 improved by 71.88 and 66.82 g, respectively. The ASM recorded in PB-1 (S-8) and PB-2 (S-21) and Control lines was 181.16 ± 0.38 , 180.78 ± 0.50 and 187.37 ± 1.90 days, respectively. The average phenotypic and genetic response of body weight at 5 week over 9 generations in PB-1 was 6.43 and 5.34 g, respectively. The corresponding values over 10 generations in PB-2 were 8.97 and 7.33 g, respectively. Center also participated in RSPT, 2016 at Gurgaon. A total of 1, 52,641 germplasms were supplied to farmers and other stakeholders during the current year. During the year 2016-17, the center generated revenue of Rs. 41.71 lakhs which is 116.49% of expenditure on feed cost.

Ludhiana Center has initiated evaluation of native chicken germplasm. A total of 2266 good chicks of local native chicken were hatched. The body weight at 4 and 8 weeks was 352.07 ± 2.79 and 648.58 ± 4.56 g, respectively. The FCR at 8 week in local native chicken was very high 4.3. The performance of PB-2 (M) \times DESI (F) and DESI (M) \times PB-2 (F) (reciprocal) were also recorded. The centre regenerated PB-1 (S-9) and PB-2 (S-41) population. Juvenile traits and production traits up to 52 weeks were also evaluated. The average body weight at 5 week was 1157.57 ± 4.3 , 1061.62 ± 3.54 and 946.87 ± 19.35 g in PB-1, PB-2 and Control lines, respectively. The effective selection differential increased in PB-1 by 84.59 g but decreased in PB-2 by 6.91 g as compared to previous generation. The body weight and feed efficiency at 5

week increased in PB-1 and PB-2 lines as compared to previous generation. The phenotypic and genetic response over last 9 generations at 5 week body weight was 10.07 and 24.50 g in PB-1 3.68 and 24 g over last 10 generations in PB-2. The percent fertility was 73.3 and 95.2% in PB-1 and PB-2 lines. The hatchability on total eggs set was 65, 89.4 and 72.3% in PB-1, PB-2 and Control lines, respectively. Centre supplied 57,950 germplasms to the farmers. During the year 2016-17, the center generated revenue of Rs.15.66 lakhs which is 94.32% of expenditure on feed.

CARI center has completed purification of local native chicken germplasm. The native chicken with colored plumage and similar phenotypic characters were retained. A total of 542 good chicks with fertility and hatchability (TES) of 94.26% and 89.47%, respectively were produced. The body weight of local native chicken germplasm at 4, 8, 12 and 20 week were 185.71 ± 3.13 , 510.44 ± 10.87 , 1307.50 ± 137.9 and 1483.56 ± 272.06 g, respectively. Juvenile traits of S-15 generation and production traits of S-14 generation in CSFL and CSML were recorded. A total of 3815 and 4208 good chicks of CSML and CSFL were produced. The fertility was 85.56% and hatchability percentage on TES and FES were 77.26 and 90.30%, respectively in CSML. A random bred control was also developed for estimation of environmental deviations. The body weight at 5 weeks of age in CSML, CSFL and control lines were 1222.63 ± 4.65 , 1209.32 ± 1.95 and 756.67 ± 7.45 g, respectively. The body at 5 week increased in CSML and CSFL as compared to previous generation. The FCR at 0-5 week in CSML, CSFL and Control was 2.12, 2.02 and 2.25, respectively. The average effective selection differential decreased over the last generation in CSML and CSFL. The intensity of selection increased in CSML as well as CSFL as compared to previous generation. The phenotypic response per generation was 15.96 and 15.85g in CSML and CSFL, respectively. While genetic response was 14.34 and 14.19 g, respectively.

Bhubaneswar centre has completed purification of native local chicken germplasm and a total of 1441 good chicks of S-1 generation were hatched with hatchability percent of 67.84 and 83.15, on TES and FES basis. The average body weight 8 week was 552.10 ± 12.21 g. The FCR was 4.26. The egg production up to 40 week in S-0 generation in native chicken was 14.27. During the period S-5 generation of CSFL and CSML were raised and evaluated for juvenile traits. During S-5 generation, a total of 3448, 3159 and 300 good chicks of CSFL,

CSML and Control lines were hatched. The body weight at 5 weeks of age in CSFL, CSML and Control lines were 1009.77 ± 4.29 , 1112.36 ± 6.18 , 769.72 ± 14.88 g, respectively. In the current year the body weight at 5 weeks remained static in CSFL and CSML. FCR up to 5 weeks of age decreased across three lines in the current generation as compared to previous generation. The phenotypic response of CSML and CSFL over four generations were 111.8 and 68.35, respectively. The genetic response in respective lines was 94.64 and 51.18. Egg production up to 40 week in CSFL and CSML were 64.32 and 61.39 in S-4 generation. EP40 has decreased in both the lines. Egg production up to 52 week increased appreciably in CSFL as well as CSML. ASM of current generation (S-4) in CSFL and CSML was lesser as compared to previous generation. The mortality percent during 0-5 weeks in CSFL, CSML and control line was 4.91, 5.06 and 6.33, respectively. This center supplied a total of 51,783 germplasm to the farmers. During the year 2016-17, the center generated revenue of Rs. 14.00 lakhs which is 72.87% of expenditure on feed.

During the present year, Tripura centre evaluated Tripura black, *Dahlem Red* and broiler dam line up to 20 weeks of age. Three way cross was evaluated from 52-72 weeks during E-1 and E-2 was evaluated up to 20 weeks of age. The percent fertility ranged from 54.41 to 85.87%. The body weight at 8 weeks was 316.44, 544.24, 1044.80 and 550.18 g in Tripura Black, *Dahlem Red*, coloured broiler dam line and BN cross, respectively. While 20 week body weight was 1105.68, 1720.28, 3240 and 1590. During first evaluation (E-1) the 72 week egg production was 121.56 and 98.72 eggs under farm and field conditions in BND cross, respectively. During E-2, body weight at 8 weeks was 565.04 and 503.00g under farm and field conditions respectively. During the year, the germplasm supply was 14,023 chicks. The centre realized a revenue of Rs. 7.98 lakhs.

Jabalpur centre evaluated G-7 generation of Kadaknath and Jabalpur colour populations up to 52 weeks of age. *Narmadanidhi* birds were evaluated in farm and field up to 52 weeks of age. The fertility remained above 80% in all the populations. During G-7 generation, the 6 week body weight was 381 and 864g in Kadaknath and Jabalpur populations. The hen housed egg production up to 40 weeks of age was 86.80 eggs in JBL population and 50.30 eggs in Kadaknath population. *Narmadanidhi* produced 69 and 127 eggs up to 40 and 52 weeks at farm. This cross produced 43, 87 and 171 eggs, respectively,

up to 40, 52 and 72 weeks in field conditions. The germplasm supplied during the year was 69,407. The center realized a revenue of Rs. 22.66 lakhs.

Guwahati centre evaluated native, *Dahlem Red*, PB-2 and BN populations up to 52 weeks of age. *Kamrupa* was also evaluated up to 52 weeks of age under farm and field conditions. The fertility remained above 76% in all the populations. The mortality during brooding and growing period was below 3.42% in all the lines. The 5 week body weight was 118.12 g in indigenous, 1065.39g in PB-2 and 365.17g in *Dahlem Red*. Indigenous birds matured early by 2.25 days and *Dahlem Red* pullets by 1.95 days compared to previous generation. In native population the egg weight and egg production up to 52 weeks was 39.85 g and 64.90 eggs, respectively. In *Dahlem Red* egg production improved by 1 egg. The five weeks body weight was 250.40 g and FCR was 3.10 in BN cross. The age at sexual maturity was 150.65 days in the farm and 172.90 days in the field. The hen housed egg production upto 40 and 52 weeks of age was 47.10 and 87.60 eggs in the farm and corresponding values in the field were 42.10 and 71.60 eggs, respectively. The centre supplied 25,021 germplasm to farmers. The center realized receipt of Rs. 4.27 lakhs during the current financial.

Ranchi centre released *Jharsim*, a dual type chicken variety. The centre evaluated G-5 generation of native population upto 60 weeks of age. During evaluation -5 (E-5) of DNB cross was evaluated 60 weeks and evaluation-6 (E-6) was evaluated up to 20 weeks in farm condition. The fertility ranged from 82.37 to 95.32% in all the lines during current year. The fertility improved marginally in all the lines as compared to previous generation. The hatchability on total eggs set ranged from 65.14 to 78.19% and it improved marginally in all the populations. The hen housed egg production up to 64 weeks was 67.78 eggs in native population during G-5 and it improved by 6.97 eggs compared to previous generation. In BN cross (E-4) hen housed egg production up to 64 weeks of age was 87.51 eggs. The body weights at 4, 8 and 20 weeks were better in DNB cross during E-5 evaluation. The hen day egg production up to 64 weeks of age was more in DNB cross (101.42 eggs) than BND cross (93.17 eggs) during E-5 evaluation under farm conditions. Centre supplied 15,103 germplasm to the farmers. The center realized a receipt of Rs. 8.90 lakhs during the financial year.

Palampur centre has evaluated the DND cross under farm and field conditions satisfactorily and it is ready for release. The native germplasm G-4 generation was

evaluated up to 52 weeks. The *Dahlem Red* population evaluated (G-4) upto 52 weeks and G-3 generation was evaluated from 52-72 weeks of age. The *Dahlem Red* X Native cross was produced and evaluated up to 52 weeks of age. The fertility was good and ranged from 81.33 to 87.22% in all the populations except in *Dahlem Red* population (61.41%) and hatchability needs improvement. The hen housed egg production in *Dahlem Red* was 67.93 eggs up to 40 weeks of age whereas native population recorded 40.10 eggs. The hen housed egg production upto 52 weeks of age was 103.90, 60.62 and 106.17 eggs in *Dahlem Red*, native and DRxN populations, respectively. The hen housed egg production in DNxD cross was 65.74 eggs in farm and 39.54 eggs in field conditions up to 40 weeks. This cross produced 148.54 eggs upto 72 weeks of age and showed improvement of 12.96 egg at farm compared to previous generation. The centre supplied 36,599 chicks of various crosses to farmers. The center realized receipt of Rs. 12.64 lakhs during the financial year.

Udaipur centre evaluated G-6 generation of *Mewari* breed up to 52 weeks of age and G-7 generation was reproduced. *Pratapdhan* (BNR cross) was evaluated up to 72 weeks during E-5 and up to 20 weeks in E-6. The fertility Ranged from 72.73-87.85 in all the populations. In *Mewari* population the juvenile body weights at 8 weeks (633g) marginally reduced during G-6 generation (651g). The pullets matured 3.11 days early as compared to previous (G-5) generation. The hen housed and hen day egg production upto 52 weeks was 38.88 and 65.07 eggs, respectively, in S-6 generation. In *Pratapdhan*, the hen day egg production was 170.89 eggs up to 72 weeks of age. The hen housed and hen day egg production up to 72 weeks has improved in E-5 as compared to E-4 evaluation. A total of 78,225 germplasm was supplied during the current year. The center realized a receipt of Rs. 20.69 lakhs during the current financial year.

IV Receipts generated

During the current year, 12 AICRP centres supplied 7,10,889 germ plasm and an amount of about Rs. 2.62 crores has been generated as receipts by AICRP centres.

Germplasm supplied and revenue generated during the year 2016-17

Centre	Germplasm Supply	Revenue (Rs. Lakhs)
Mannuthy	136743	64.26
Anand	39474	26.72
Bengaluru	152641	33.79

Ludhiana	57950	15.66
Bhubaneswar	51783	14.00
CARI	33830	30.00
Udaipur	78225	20.69
Jabalpur	69407	22.66
Guwahi	25111	4.28
Palampur	36599	12.64
Ranchi	15103	8.90
Agartala	14023	7.98
Total	710889	261.58

Poultry Seed Project

“Poultry Seed Project” was evolved with a sole aim to increase the availability of rural chicken germplasm in remote areas of our country. In this endeavour, the Indian Council of Agricultural Research has initiated “Poultry Seed Project” during the XI five year plan with six centres, three in the northeast region and three in different state veterinary/agricultural universities. The project has been strengthened during the XII plan by adding five more centres to cater to needs of the farmers in their respective regions. In addition, one non funding centre is also functioning. The main objective of this project is local production of improved chicken germplasm (fertile eggs, day old chicks and grownup chicks) and supply to various stake holders in the remote areas to target production enhancement of egg and meat for augmenting rural poultry production, socio-economic condition of the target groups and linking small scale poultry producers with organized markets.

The PSP centres are located at West Bengal University of Animal and Fishery Sciences, Kolkata; Bihar Agricultural University, Patna; Chhattisgarh Kamadhenu Viswa Vidyalaya, Durg, ICAR Research complex, Nagaland regional centre, Jharnapani; ICAR-National Organic Farming Research Institute, Gangtok; ICAR Research complex, Manipur regional centre, Imphal; Tamil Nadu Veterinary and Animal Sciences University, Hosur, ICAR-Central Coastal Agricultural Research Institute, Panaji; ICAR-Central Island Agricultural Research Institute, Port Blair; ICAR-IVRI Regional Station, Mukteswar; Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar. A non funded Centre was also initiated at ICAR Research Complex for NEH Region, Umiam. The Directorate as a coordinating unit, supplies parent chicks, co-ordinates and monitors the activities of different centres to enable them to achieve the set targets for each centre. The seed project was launched on 15th May, 2009. The target

set for supplying chicks for mainland and north-east centres during the year under report (2016-17) were between 0.3 and 1.0 lakhs chicks per annum for different centres and to collect feedback on the performance of the germplasm under backyard farm conditions. A total of 4, 38, 822 improved chicken varieties have been distributed in their respective regions/states during the year.

Nine batches of *Vanaraja* parents were reared during the year at Kolkata Centre. A total of 1135 female parents and 229 male parents of *Vanaraja* are in position at present. The average hen day egg production (HDEP) ranged from 25.03 (55-84 weeks) to 46.38% (24-63 weeks) in *Vanaraja* parents. The fertility rate ranged from 83.96 to 87.87% across the batches. The average hatchability on total egg set was 72 to 77 in *Vanaraja* female parents. A total of 63,554 chicks of *Vanaraja* were distributed to farmers of West Bengal and adjoining north eastern states with an amount of Rs. 7.50 lakhs revenue.

Three batches of *Vanaraja* parents were reared under deep litter system at Patna Centre. The 20 week body weight was 2770.6 ± 51.23 and 1767.74 ± 46.56 g in *Vanaraja* male and female parents, respectively. The age at sexual maturity was 167 days in *Vanaraja* female line parents. The HDEP in *Vanaraja* at 40 weeks of age was 52.57% with an egg weight of 52.24 g. The average fertility and hatchability (TES) was 86.78% and 72.68% in *Vanaraja* parents. A total of 55, 329 improved chicken germplasm was distributed with an amount of Rs. 10.60 lakhs revenue from the Centre.

Two batches of *Vanaraja* parents are in laying stage and one batch is in growing stage at Durg. The 20 week body weight in male and female lines was 1654.6 and 1125.5 g, respectively. The average HDEP was 46.8% (24-56 weeks) in *Vanaraja*. The peak egg production of 68% was attained at 36 weeks of age and continued till 56 weeks of age. The average fertility percent in *Vanaraja* female line was 79.53. The hatchability on total egg set was 81.31%. A total of 31, 224 improved chicken germplasm of *Vanaraja* were distributed to 224 farmers covering 85 villages across Chhattisgarh. An amount of Rs. 8.86 lakhs revenue was generated from the Centre.

Five batches (3 *Vanaraja* and 2 *Srinidhi*) of parents were reared at Jharnapani. The body weight at 20 weeks of age in male and female lines was 2218.6 ± 92.43 and 1613.16 ± 37.53 g in *Vanaraja* and 3382.25 ± 86.40 and 1314.53 ± 28.71 in *Srinidhi*, respectively. The production of 50% was attained at 36 weeks of age

and maintained till 46 weeks of age in both female parents. The peak production of 69% was recorded at 50 weeks in *Vanaraja* and 72% at 43 weeks of age in *Srinidhi*. The fertility rate varied from 87 to 93% in *Vanaraja* and 73 to 93% in *Srinidhi* female lines. The hatchability on fertile eggs set varied between 61-77% in *Vanaraja* and 68-82%, in *Srinidhi* parents, respectively. A total of 81,729 improved chicken germplasm was distributed to farmers with 36.61 lakh revenue at Jharnapani. The centre achieved the set targets and effectively popularized the rural poultry farming in tribal and rural areas of Nagaland.

Two batches of *Vanaraja* parents were reared at ICAR-NOFRI, Gangtok, Sikkim during the year. The body weight of male and female parents of *Vanaraja* at 20 weeks of age was 2040 and 2470 g, respectively. The average HDEP in *Vanaraja* was 52.76 (27-64 weeks) with an average egg weight of 58.04 g. Peak production (50-67%) was attained at 30 weeks of age and sustained till 58 weeks of age. The average fertility and hatchability (TES) rates in *Vanaraja* female line were 85.59 and 76.98% respectively. A total of 71109 improved chicken germplasm (*Vanaraja*) was distributed to 2702 farmers covering 626 villages across Sikkim. An amount of Rs. 32.87 lakhs revenue was generated from the Centre. The Centre achieved the set targets and popularized the backyard poultry farming in tribal and rural areas of Sikkim.

Two batches of *Vanaraja* and two batches of *Srinidhi* parents were reared at Manipur Centre. The body weight at 20 weeks of age in male and female parents of *Vanaraja* and *Srinidhi* was 3142.92 and 2104.11 g and 4005.86 and 1532.08 g, respectively. A total of 17428 improved rural chicken germplasm was distributed to the farmers. The Centre has generated Rs. 20.06 lakhs of revenue during the year. The body weight at 20 weeks of age in male and female chicks was 3457.43 and 2128.72 g in *Vanaraja* and 3842.47 and 1473.42 g in *Srinidhi*, respectively under field conditions. The centre has conducted training/awareness programs in poultry farming to the farmers.

Two batches of *Vanaraja* and *Gramapriya* parents were reared at Hosur Centre. The body weight at 20 weeks of age in male and female parents was 2400 ± 110.7 and 1920.0 ± 38.6 g in *Vanaraja* and 2389.0 ± 68.4 and 1461.7 ± 28.5 g in *Gramapriya*, respectively. The HDEP ranged from 53-59 (36-76 weeks) in *Vanaraja* and 63-78% (36-76 weeks) in *Gramapriya*, respectively. The fertility ranged from 79 to 94% in *Vanaraja* and 73-90% in *Gramapriya*. The hatchability on total egg set (TES) was consistent throughout the

life cycle reaching up to 90% in *Vanaraja* and 85% in *Gramapriya*. A total of 115956 improved rural chicken germplasm were distributed to 656 farmers in Tamil Nadu. The Centre has generated total revenue of Rs. 23.64 lakhs. The body weight at 12 weeks of age under field conditions was 1390.00 g in *Vanaraja* and 1013.30 g in *Gramapriya*, respectively. The centre has achieved the target and effectively disseminated the technologies to end users.

The construction of poultry houses and hatchery are in progress at Goa. One batch each of *Gramapriya* and *Srinidhi* parents were reared at Goa in the existing facility. The body weight at 20 weeks of age in male and female parents was 2821.67 and 1049.23 g in *Gramapriya* and 2825.78 and 1133.18 g, in *Srinidhi*, respectively. The egg production started at 22 weeks of age in both female parents. The production attained about 30% at 32 weeks of age.

The construction of poultry houses and hatchery is in

progress at Port Blair. One batches each of *Vanaraja* and *Gramapriya* parents were reared under deep litter system. The 20 week body weight in male and female lines was 2819.25 \pm 40.03 and 1813.4 \pm 27.29 g in *Vanaraja* and 2337.1 \pm 30.52 and 1504.1 \pm 18.42 in *Gramapriya*, respectively. The age at sexual maturity (ASM) was 168 days. The 40 week HDEP was 50% in *Vanaraja* parents. A total 1300 *Vanaraja* chicks were distributed in Andaman & Nicobar Islands with revenue of Rs. 32745 during the year.

The construction of civil works is nearing completion at Srinagar. One batch of *Vanaraja* parents are maintained under deep litter system during the year. The body weight at 20 weeks of age was 2423.34 \pm 57.91 g in male and 1864.42 \pm 16.01 g female parents of *Vanaraja*. The age at first egg was 181 days. The egg production attained 49% during 37-40 weeks of age. A total of 2234 *Vanaraja* chicks were distributed to 90 farmers in four districts of Jammu and Kashmir.

Centre wise distribution of germplasm under Poultry Seed Project

Sl. No.	Centre	Germplasm	Revenue (Rs. in lakhs)
1	West Bengal University of Animal and Fishery Sciences, Kolkata	63615	7.5
2	Bihar Agricultural University, Patna	55329	10.6
3	Chhattisgarh Kamadhenu Viswa Vidyalaya, Durg	31224	8.85
4	Regional Centre, ICAR Research complex for NEH Region, Jharnapani	81729	36.61
5	ICAR- National Organic Farming Research Institute, Gangtok	71407	32.87
6	Regional Centre, ICAR Research complex for NEH Region, Imphal	17428	20.26
7	Tamil Nadu Veterinary and Animal Sciences University, Hosur	115318	23.77
8	ICAR-Central Coastal Agricultural Research Institute	223	-
9	ICAR-Central Island Agricultural Research Institute, Port Blair	1300	0.33
10	ICAR-IVRI Regional Station, Mukteswar	-	-
11	Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar	2234	-
12	ICAR Research Complex for NEH Region, Umiam, Barapani	-	-
	Total	438822	140.79

BUDGET
EXPENDITURE AND RECEIPTS DURING 2016-2017

(Rs. In lakhs)

AICRP Centre	Actual budget released (ICAR share)	Budget for (State share)	Total expenditure incurred	Expenditure on feed	Receipts
KVASU, Mannuthy	54.75	18.25	71.51	32.99	64.26
AAU, Anand	55.00	18.33	70.67	34.79	26.72
OUAT, Bhubaneswar	49.88	16.25	47.86	19.21	14.00
GADVASU, Ludhiana	51.75	17.25	69.00	16.60	15.66
KVAFSU, Bengaluru	55.50	18.50	61.71	35.81	33.79
MPPCVV, Jabalpur	61.50	20.50	84.57	29.76	22.66
NEH, Agartala	50.00	---	37.87	24.16	7.98
AAU, Guwahati	57.75	19.25	77.00	12.65	4.28
CSKHPKV, Palampur	48.75	16.25	63.26	17.22	12.64
BAU, Ranchi	51.75	17.25	73.99	17.70	8.90
MPUAT, Udaipur	57.57	19.13	65.11	26.71	20.69
CARI, Izatnagar	-	-	-	-	30.00
Total	594.00	181.33	722.55	267.60	261.58

History of ICAR-Directorate of Poultry Research

The Directorate of Poultry Research had a modest beginning during the IV five year plan period. Indian Council of Agricultural Research sanctioned two coordinated projects entitled “All India Coordinated Research Project on Poultry for Egg” and All India Coordinated Research Project on Poultry for Meat” to evolve suitable strains of egg and meat type chicken that combine well for production of commercial layer and broiler crosses. Both these projects were merged into a single project known as “All India Coordinated Research Project on Poultry Breeding” during the V plan period with no change in objectives. The ‘Rural Poultry’ component of the project was initiated with one centre at Agartala in 2001. Subsequently it was expanded to six centres during XI plan with the sole objective of development of location specific rural poultry varieties. This was elevated to the status of a Project Directorate during the VII plan period. Besides AICRP on Poultry Breeding, Project Directorate also encompassed two more coordinated projects i.e. AICRP on Poultry Nutrition and AICRP on Poultry Housing and Management, which were subsequently phased out during 1992-93.

The head quarter of the Directorate of Poultry Research was established at Andhra Pradesh Agricultural University, Rajendranagar, Hyderabad with effect from 1st March, 1988. Coordination and monitoring had been the only work assigned to the Directorate Unit (Coordination Cell) to start with. Subsequently, Nucleus Stock Production Unit as a centre of AICRP on Poultry Breeding was established at the Directorate for multiplication and supply of the parents and their commercial crosses released from the project centres. From 1st April, 1990 the Project Directorate had been entrusted with additional responsibilities of maintenance, evaluation, reproduction and supply of control populations of egg and meat to the centres. Maintenance of layer and broiler control previously maintained at HAU, Hissar and UAS, Bengaluru respectively was assigned to this Directorate w.e.f. 1.4.1990. The Directorate was also entrusted with the evaluation of commercial layers and broilers developed at different centres of the project vis-à-vis those available in the market from other hatchery sources and maintenance of the elite stocks of layers and broilers available in the country/to be imported from abroad in future and to undertake their genetic description and characterisation with respect to biochemical, immunological, cytogenic and disease resistance traits. Research was also envisaged in

the areas of poultry nutrition, poultry housing and management, and poultry health. Identification of alternative feed resources and their chemical and biological evaluation and development of least cost poultry ration was the priority of poultry nutrition research. In the discipline of poultry housing and management, biological efficiency of different management practices for economic poultry raising was intended to be determined. Surveillance and monitoring of poultry diseases and development of kits for quick diagnosis of diseases was proposed to be the main objective of poultry health research. Currently the Directorate is operating its research programmes within the frame work of the approved Perspective Plan. During the year 2014-15 the Project Directorate on Poultry has been upgraded to Directorate of Poultry Research.

OBJECTIVES

During the year 2014-15, AICRP on Poultry Breeding was reoriented towards Rural Poultry. Therefore for the current year the objectives of AICRP on Poultry Breeding are as follows.

AICRP on Poultry Breeding

Objectives

1. To develop location specific chicken varieties and their dissemination for village poultry
2. Conservation, improvement, characterization and application of local native and elite layer and broiler germplasm
3. To develop package of practices for village poultry and entrepreneurs in rural, tribal and backyard areas etc.

Location of the Centres

AICRP on Poultry Breeding

1. Anand Agricultural University, Anand
2. Kerala Veterinary and Animal Science University, Mannuthy
3. Karnataka Veterinary, Animal and Fishery Sciences University, Bengaluru
4. Central Avian Research Institute, Izatnagar
5. Guru Angad Dev Veterinary and Animal Science University, Ludhiana
6. Odisha University of Agriculture and Technology, Bhubaneswar.

- | | | |
|---------------------------------------------------------------------|-----------------------|--------------------------|
| 7. ICAR Research Complex for NEH region, Agartala | 9. NDVSU, Jabalpur | 11-06-1970 to 31-03-2017 |
| 8. Nanaji Deshmukh Veterinary Science University, Jabalpur | 10. AAU, Guwahati | 23-03-2009 to 31-03-2017 |
| 9. Assam Agricultural University, Guwahati | 11. BAU, Ranchi | 23-03-2009 to 31-03-2017 |
| 10. Birsa Agricultural University, Ranchi | 12. MPUAT, Udaipur | 23-03-2009 to 31-03-2017 |
| 11. Maharana Pratap University of Agriculture & Technology, Udaipur | 13. CSKHPKV, Palampur | 23-03-2009 to 31-03-2017 |
| 12. CSK Himachal Pradesh Krishi Viswavidyalaya, Palampur. | | |

Control Population Units (Meat and Egg)

1. ICAR-Directorate of Poultry Research, Hyderabad

Period For Which The Scheme Is Sanctioned

AICRP on Poultry Breeding

- | | | |
|---------------------------------------------------|----------------------------------------------------|--|
| 1. SVVU, Hyderabad | 26-03-1971 to 31-12-2014 | |
| 2. AAU, Anand | 06-07-1977 to 31-03-2017 | |
| 3. KVASU, Mannuthy | 19-02-1977 to 31-03-2017 | |
| 4. KVAFSU, Bengaluru | 14-01-1970 to 31-03-2017 | |
| 5. GADVASU, Ludhiana | 26-02-1977 to 31-03-2017 | |
| 6. OUAT, Bhubaneswar | 21-01-1971 to 1990 and
01-09-1991 to 31-03-2017 | |
| 7. CARI, Izatnagar | 01-04-1970 to 31-03-2017 | |
| 8. ICAR Research complex for NEH region, Agartala | 01-08-2001 to 31-03-2017 | |

Monitoring role of the coordinating unit/ Directorate:

1. Organization of Review Committee meeting/ scientists meet/workshops
2. Compilation of periodical reports received from individual centres for submission to ICAR and preparation of Annual Report.
3. Verification and scrutiny of proposals received from different centres in all aspects relating to budget, release of funds and in all other matters relating to the functioning of various centres and their onward transmission to ICAR.
4. Preparation of EFC proposals.
5. Preparation of DARE's Report and Research Highlights
6. Compilation of report for answering the parliament questions
7. Visit to different centres of the project for review of progress.

Technical Program

AICRP on Poultry Breeding

Activities time scale for all egg and meat centres for local native germplasm

Activities	Guidelines	Time	Information
Survey of the area to know the demand of the people (egg, meat or dual)	As per NBAGR proforma and guidelines	By November, 2014	All egg type and meat type
Collection and evaluation of local native germplasm	About 500 females and 100 males	By December, 2014	
Hatching of S-0 chicks by random mating	S-0 (2000 chicks)	By September, 2015	
Evaluation, purification and selection for S-1 parents	Housing (700-800 female and 200 male) 480 dams and 80 sires	By June, 2016	Selection for 40 week egg production for egg type and 8 week body weight, if selected for meat type
Hatching of S-1 chicks	3000 chicks	By August, 2016	
Evaluation, purification and selection for S-2 parents	80 sires and 480 dams	By March, 2017	
Production and evaluation of crosses		By March, 2018	

Data to be collected

1. Body weight at 0 Day, 4, 6, 8, 12, 20 and 40 weeks
2. Age at sexual maturity
3. Egg weight at 28 and 40 weeks
4. Egg production up to 40 weeks (up to 52 weeks in first batch)
5. Mortality, 0-6 weeks, 7-20 weeks and 21-40 weeks
6. Mortality target
 1. 0-6 weeks should be <6%
 2. 7-20 weeks should be <6%
 3. 21 week onwards should be <1% per month

Technical Programme for Rural Poultry Production

A. Technical Programme in Brief for the year 2016-2017

- Pedigreed hatching and evaluation of the local native chicken.
- Procurement and evaluation of improved chicken germplasm in the local climatic condition and for development of cross.
- Production and evaluation of direct cross of local native birds with improved germplasm.
- Development and evaluation of terminal cross (location specific germplasm).

Detailed technical programme for Rural Poultry

On the basis of survey a decision is to be taken about the type of chicken to be developed by the centre.

Development of crosses

For dual type chicken

CB/ Improved broiler germplasm X Local native



(Farm) Evaluation of F1 --- (F1) X RIR/ DR --- and crossing with improved line
(50% Imp Ger pl + 50% Local native)



Crossbred Evaluation under farm & field conditions
(25% Imp Ger pl + 25% Local native + 50% RIR/ DR)



Repeat of the above



Selection of parental populations



A) For egg type chicken

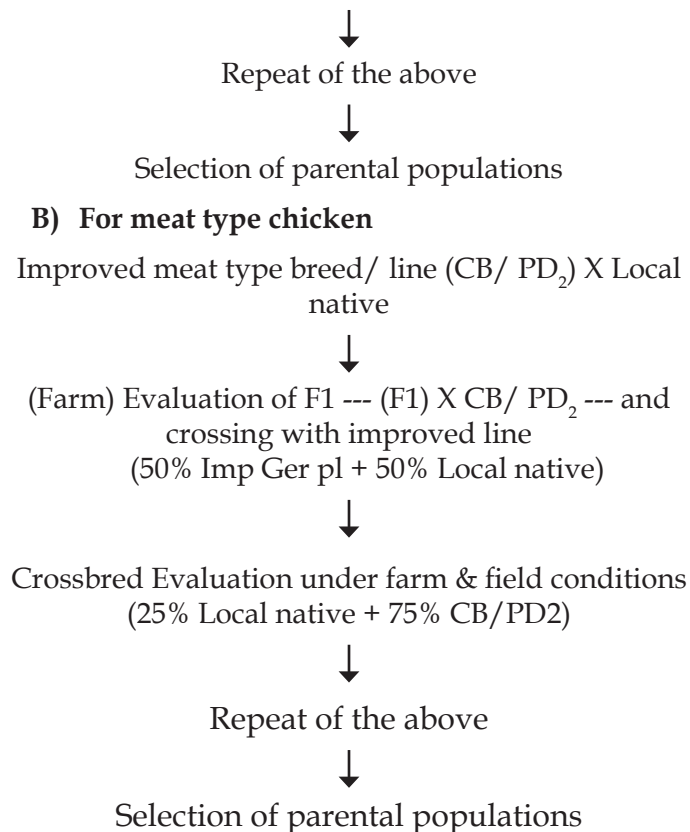
Improved egg type breed/ line (RIR/ DR) X Local native



(Farm) Evaluation of F1 --- (F1) X RIR/ DR --- and crossing with improved line
(50% Imp Germ pl + 50% Local native)



Crossbred Evaluation under farm & field conditions
(25% Local native + 75% RIR/DR)



NB: RIR - Rhode Island Red; DR - *Dahlem Red*; CB - Control Broiler; PD₂ - Coloured synthetic female broiler line

Flocks to be selected for Rural Poultry

- Local native chicken (with better phenotypic performance) in the respective agro-climatic zones (preferably with similar phenotypic appearance).
- Improved egg type or meat type chicken developed by ICAR/ SAUs to be procured.

Selection of native birds (Egg type)

- Collection of about 300 females and 60 males initially
- Production of 1000 chicks by random mating
- Subsequent generations - To produce 1500 chicks utilizing 50 sires, 250 dams
- At the time of housing - To select 500 pullets, 150 males
- Primary trait - 40 wks egg production

Recording of traits

- Body Weight at 20 and 40 wks
- ASM
- Egg weight at 28, 40 wks
- Egg production to 72 weeks
- Mortality - 0-6, 7-20, 21-40 and 41-72 wks

- Field Evaluation of about 250 birds under backyard/free range

Selection of native birds (Meat type)

- Collection of about 300 females and 60 males initially
- Production of 1000 chicks by random mating
- Subsequent generation - To produce 1500 chicks utilizing 50 sires and 250 dams
- Selection for 8 wk body weight - To select 600 females, 250 males
- At the time of housing - 500 pullets, 150 males

Recording of traits

- BW at day old, 4, 6, 8, 12, 20 and 40 wks
- ASM
- EW at 28, 40 wks
- EP to 40 wks
- Mortality - 0-6, 7-20, 21-40 wks

Field Evaluation of about 250 birds under backyard/free range and collection of data.

Conservation of Elite Germplasm

A. Layer lines

1. Layer centres will work on maintenance of elite layer populations.
2. Collection, characterization and conservation of local native germ plasm.
3. Production and evaluation of crosses under farm and field conditions.
4. Development location specific varieties.
5. Impact assessment.
6. The strains that are being maintained at present will be continued. IWH, IWI, IWD, IWF and IWK will be maintained at ICAR-DPR, Hyderabad. IWN and IWP, strains will be maintained since they have been identified as most promising lines. IWG, IWJ and will be maintained by the respective center on a small population size.
7. To maintain the pure line performance, the selection programme currently under progress in the AICRP will be continued with lesser intensity of selection. The entire flock of each population will be maintained till 64 weeks of age. The following traits will be measured:

- i) Age at first egg.

- ii) Body weight at 16, 40 and 64 weeks of age.
- iii) Egg weight at 28, 40 and 64 weeks of age.

For those populations having low egg weight, the first ten eggs also need to be measured.

- iv) Egg production to 40 and 64 weeks of age and computation of egg production on hen housed and hen day basis.
- v) A random sample of 100 eggs will be utilized at 40 weeks of age to measure albumen height and index, yolk height and index and shell thickness and Haugh unit score. The percentage of blood and meat spots will also be recorded.
- vi) Percent fertility and percent hatchability on total and fertile eggs set will be measured. The minimum expectation will be more than 90% fertility and 80% hatchability on fertile eggs set.
- vii) Mortality during the following periods:
 - a) 0-8 weeks b) 9-16 weeks c) 17-40 weeks d) 41-64 weeks e) 17-64 weeks

The minimum expectation will be less than 6% mortality during 0-8 weeks. Less than 5% mortality during 9-16 weeks. Less than 1% mortality per month during the period 17-64 weeks in the layer house.

- viii) Among the selected breeders, three eggs from each female will be broken for measuring the shell thickness. Breeders with very thin shell eggs will be replaced by breeders with better egg shell thickness before the mating are arranged.
- 8. All centers will maintain all the surviving birds of first hatch to record egg production till 72 weeks of age.
- 9. Only 350 females and 50 males will be selected from each population to reproduce next generation (only by artificial insemination). It is expected that in four hatches of 10 days interval, a total of 1400 female chicks and 500 male chicks will be hatched for each population.
- 10. A total of at least 600 pullets for each population will be housed at 16 weeks of age in individual laying cages for generating the traits mentioned above at item no. 2. The desired number of males will have to be housed for each population.
- 11. Only 300 males will be retained at 16 weeks of age at the rate of two males per dam family. They may be housed either in cages or on deep litter in floor pens depending on the available facilities (all care should be taken to prevent mortality in

the males, saved at 16 weeks, as it will affect the selection differential from the male side and also the average selection differential).

- 12. The hen housed egg production up to 64 weeks of age will be the criterion of selection.
- 13. The selection will be practiced in both the sexes for 64 weeks, hen housed egg production, and 28 weeks egg weight. Selection for egg production will be carried out on the basis of an index that takes into account individual production and its sire and dam family averages (Osborne, 1957 a and b). The selection for egg weight, obtained at 28 weeks, will be utilized as independent culling level selection to be superimposed over the selection for 64 weeks egg number. For giving due weightage to viability, in selection programme only hen housed family average need to be used in computation of Osborne index values.
- 14. Based on the index values, only 450 pullets will be selected on the basis of egg production. Out of these 450 pullets, based on the low early egg weight and shell thickness, 100 pullets will be rejected. Thus, finally only 350 pullets and 50 males will be selected which are good for egg production having better egg weight and with good shell thickness.
- 15. The chicks will be sexed at hatching, in all layer populations and 1400 females and only 500 males at the rate of 18 males per sire family will be saved. All male chicks will be dubbed.
- 16. All centres will keep a sample of layer control females hatched from the hatching eggs received from ICAR-Directorate of Poultry Research (at least 200 females will have to be housed at 16 weeks of age). They will also be evaluated along with the selected populations.
- 17. Uniform reporting of the data by all the centres.
- 18. Maximum publicity through media for popularizing high yielding strains/ varieties developed by AICRP on Poultry Breeding.
- 19. Each centre will record rate of lay and persistency of peak production will be recorded.
- 20. The layer control will be supplied by ICAR-DPR to all the centres.

Programme for Layer Control population

The technical programme currently under progress for control populations for egg will be continued. Each population will be reproduced using 50 sires, each sire mating to 4 dams and 4 progeny per dam are to be studied for various growth, production and

reproduction traits. In order to obtain 4 progeny for each dam at the time of housing the suitable numbers of chicks are to be hatched.

The following traits are to be measured in case of layer control population

1. Body weight at 16, 40 and 64 weeks of age.
2. Age at first egg.
3. Egg weight at 28 and 40 weeks of age.
4. Egg production to 40 weeks of age and 64 weeks of age.
5. Per cent fertility and hatchability on total and fertile eggs set.
6. Egg quality traits like albumin index, yolk index, shell thickness and percentage blood and meat spot on a sample of 100 eggs at 40 weeks of age.
7. Mortality during the following period 0-8 weeks, 9-16 weeks and 17 to 40, 40-64 and 17-64 weeks.
8. About 500 eggs are to be supplied to each egg centre from the Project Directorate for evaluation of environmental trends.

B. Broiler lines

Development of sire and dam line population

1. Broiler centres will work on maintenance of elite broiler populations.
2. Collection, characterization and conservation of local native germ plasm.
3. Production and evaluation of crosses under farm and field conditions.
4. Development location specific varieties.
5. Impact assessment.
6. The centres will continue to develop the existing female line available with them.
7. Centres involved in development of dam line population will produce 3,000 chicks each generation.
8. It is expected that at least 3000 chicks will contribute to data at 5 weeks for making necessary selection.
9. Between 5th and 6th week, out of the 1750 females, a total of **1200** females will be chosen by mass selection based on 5 week body weight.
10. Among the 1750 males **250** best males will also be mass selected on body weight at 5 week.
11. At the age of 12 weeks a physical selection will be taken up and **1000** females without any physical defects will be retained and **200** males will also be retained after screening them for satisfactory physical appearance.
12. All the surviving females will be housed in individual cages. The minimum numbers of females need to be ensured to be at least **500** females.
13. Simultaneously, **150** best males out of the 200 males physically selected at 12 weeks of age will also be housed in cages or on deep litter.
14. The females will be evaluated for dam line traits till the time the youngest hatch attains 40 weeks of age and sire family selection will be practiced.
15. Out of the surviving females, a total of **350** females will be selected and will be mated to **70** best males selected from the available 200 males housed at 18 weeks of age to obtain replacement progeny.
(The artificial insemination is mandatory to reproduce the next generation so as to ensure high percentage fertility and good number of chicks.)
16. It is estimated that in 4 to 5 hatches of 7 to 10 days interval, the required number of chicks can be reproduced from the 350 selected female breeders mated to 70 selected male breeders.
17. The criterion of selection, for the females, will be the sire means for settable egg production. Similarly, the males from the sire families from which females have been chosen will be selected as male parents.
18. The shape index of the eggs needs to be measured at 32 weeks of age by measuring the length and width of egg. It is desirable to measure the shape index for five consecutive days. The acceptable shape index is suggested as 1.30 to 1.50.

Restriction programme

Since the birds are selected at 5 weeks of age, a graph has to be generated assuming a target body weight of 2150 to 2200g at 20 weeks of age in dam line and 2400g at 20 weeks in sire line. Assuming linearity, a graph has to be developed starting from the mean weight of the selected birds at 5 weeks of age and the expected body weight at bi-weekly interval need to be identified as applicable to populations at each centre. The trend of the body weight at different ages during the restriction program needs to be plotted along with the expected line. The feed need

to be increased or retained the same according to the adjustment needed for matching with the proposed graph. The allowance arrived, as per the graph, at different ages can be increased by 10 percent in case of males for achieving similar trend of body weight during the restriction period.

Feed formulation

To keep the nutrient content uniform at all the centres, the following recommendations are given.

ICAR-DPR, Hyderabad:

1. This centre will maintain the pure lines that are being withdrawn from different centres as nucleus stock.
2. Regeneration and supply of control population to different centres for evaluation of selected lines.

Programme for Broiler Control population:

The technical programme currently under progress for control populations for meat will be continued. Each population will be re-produced using 50 sires, each sire mating to 4 dams and 4 progeny per dam are to be studied for various growth, production and

reproduction traits. In order to obtain 4 progeny for each dam at the time of housing the suitable number of chicks is to be hatched.

In case of broiler control population the following traits are to be measured:

1. Body weight at day old 5, 20 and 40 weeks of age.
2. Feed consumption to 5 weeks of age.
3. Age at first egg.
4. Egg production to 40 weeks of age.
5. Egg weight at 40 weeks of age.
6. Per cent fertility and hatchability on total and fertile eggs set.
7. Mortality during the following periods 0-5 weeks, 6-20 weeks, 21-40 weeks
8. Restricted feeding programme is to be practiced from 6 to 20th week.

About 300 to 400 hatching eggs of Control line are to be supplied to each of the broiler centres of the ICAR-Directorate of Poultry Research during their hatching season, for evaluation of environmental trends.

Table 1. Nutrient requirement for broiler lines

Nutrient	Chicks 0-5 weeks	Growers 6-18 weeks	Pre-breeders 19-23 weeks	Breeders 24-54 weeks
Energy K.cal/kg	2800-2850	2750-2800	2750-2800	2800
Protein (%)	20	16	16	17
Lysine (%)	1.00	0.80	0.80	0.75
Methionine (%)	0.52	0.41	0.41	0.35
Ca (%)	1.0	1.0	2.00	1.0- 3.5
Phosphorus (%)	0.45-0.50	0.45	0.45	0.45
Choline Chloride 50% (%)	0.1	0.1	0.1	0.1
Sodium Chloride	0.4	0.4	0.4	0.4

Performance Appraisal of Different Centres

Kerala Veterinary and Animal Sciences University, Mannuthy

Programme activity assigned

- Conservation, characterization and improvement of the native chicken germplasm collected from the field.
- The egg production up to 64 weeks will continue to be the selection criterion in IWN and IWP strains; the target is 305 eggs up to 72 weeks of age for crosses.
- The centre will maintain all the surviving birds of first hatch to record egg production till 72 weeks of age.
- To participate with IWN x IWP cross in RSPP tests being conducted by Govt. of India each year.
- To produce and evaluate crosses with native chicken under farm and field conditions.
- To develop location specific chicken varieties and their dissemination for village poultry.

Action taken

- The native birds belonging to S-1 generation produced in this centre has completed testing up to 40 weeks of age. Egg production up to 40 weeks of age was 72.08 ± 1.06 .
- S-2 generation of native birds produced by pedigree mating has completed testing up to 32 weeks of age.
- 1009 female birds of IWN and 1006 female birds of IWP strain in S-29 generation have completed testing up to 64 weeks of age.
- The body weight at 16, 40 and 64 weeks of age was 1051, 1447 and 1498 g respectively for IWN and 1042, 1427 and 1486 g respectively for IWP strains in S-29 generation.
- The sexual maturity was 141.4 and 139.9 days in IWN and IWP strains respectively. The egg weight at 64 weeks of age was 53.19 and 53.58 g respectively in IWN and IWP strains.
- The hen-housed egg number up to 64 weeks of age was 254.96 in IWN and 261.25 in IWP strain. The values of hen-day and survivors' egg

production up to 64 weeks of age were 260.17 and 261.57 respectively in IWN and 267.90 and 268.79 respectively in IWP strain in S-29 generation.

- The IWN X IWP birds were supplied to farmers.

Details of the implementation of programme and results achieved

A. Development of location specific rural germplasm (egg type)

Production traits

A population of native birds of S-1 generation was evaluated from 33 to 40 weeks of age in the reporting period of 2016-17 and its growth and production performance is presented in Table 1. Hen housed egg production up to 40 weeks of age has improved by 2.25 eggs in this generation (Table 1).

Table 1. Average egg production and egg weights of native birds (S-1 generation)

Traits	N	Mean \pm SE
Body weight at 40 weeks of age (g)		
Males	195	1876 \pm 14.53
Females	569	1378 \pm 9.88
Egg weight at 40 week (g)	428	41.77 \pm 0.20
Hen housed egg production (40 weeks)	713	72.08 \pm 1.06
Hen day egg production (17-40 weeks) Nos.	-	74.65
Survivors' egg production (17-40 weeks)	621	76.67 \pm 1.03

Fertility and hatchability

S-2 generation of native chicken produced by pedigree mating has completed testing up to 32 weeks of age. The number of sires and dams used for breeding to produce the S-2 generation was 50 and 250 (1:5) respectively. High fertility and hatchability rates were observed in native birds in S-2 generation as well (Table 2).

Table 2. Summary of Incubation and Hatching Performance of native chicken in S-2 generation

Gens.	No. of hatches	Eggs set (N)	Infertile eggs (N)	Fertility (%)	Total chicks (N)	Dead germ (N)	Good chicks (N)	Hatchability (%)	
								TES	FES
S-1	2	6164	328	94.9	5801	285	5796	90.55	95.39
S-2	2	2780	167	93.99	2520	228	2507	90.60	98.75

Growth traits

The body weight, ASM and egg weight are presented in Table 3. Body weights from day 0 to 16 weeks of age in both male and females reduced in S-2 generation over S-1 generation. Similarly egg weight at 28 and 32 weeks reduced marginally in S-2 generation over S-1 generation.

Table 3. Mean body weights, ASM and egg weights of native birds (Mean ± SE)

Traits	Females			Males		
	N	S-2 Gen.	S-1 Gen.	N	S-2 Gen.	S-1 Gen.
Body weight (g)						
0 day	260	28.1±0.18	30.2±0.97	248	28.5±0.18	30.4±0.95
4th week	1022	258.9±1.5	225±1.5	428	282.4±2.8	283±14.8
8th week	1001	540±2.95	460±2.8	450	667±5.03	538±4.7
16th week	606	986±15.5	992±7.00	210	1289±22.2	1319±10.4
ASM (days)	606	156.8±1.53	157.5±1.2			
Egg weight (g)						
28 weeks	515	39.64±0.16	40.90±0.15	-	-	-
32 weeks	501	40.78±0.16	41.60±0.17	-	-	-

Mortality in native birds

Less mortality was observed during 0-8 and 9-16 weeks of age in S-2 generation. However, mortality during 17-40 weeks of age was on higher side in S-1 generation (Table 4).

B. Improvement of IWN and IWP strains of White Leghorn

The centre evaluated IWN and IWP strains for S-29 generation up to 64 weeks of age during the year 2016-2017. S-30 generation of IWN and IWP strains

were produced and evaluation is under progress (up to 5 weeks of age).

Selection records

The summary of selection records for last five generations is presented in Table 5. The average (both male and female) effective selection differential in IWN and IWP strains was 10.05 and 8.54 respectively (on lower side) in S-30 generation.

Table 5. Summary of selection records of IWN and IWP strains for last five generations

Strains	Generations	Sires	Dams	Ne (Contributed)	SD in females	SI (σ)
IWN	S-26	50	287	170.3	14.95	0.477
	S-27	50	288	170.4	21.61	0.483
	S-28	50	278	169.5	14.40	0.580
	S-29	50	277	169.4	14.39	0.320
	S-30	50	298	171.3	10.55	0.27
IWP	S-26	50	293	170.8	16.07	0.474
	S-27	50	294	179.3	20.57	0.505
	S-28	50	275	169.2	17.90	0.490
	S-29	50	263	165.2	16.66	0.330
	S-30	50	297	171.2	10.26	0.29

Incubation records

Fertility in IWN strain increased in S-30 generation by about 4% compared to its previous generation. However, there is no improvement in fertility of IWP strain and it was lesser than that of control population. There is an improvement in hatchability both on total and fertile egg set basis in IWN, IWP and control populations as compared to those in previous generation (Table 6).

Table 4. Mortality records for native birds S-1 generation

Generation	0-8 weeks			9-16 weeks			17-40 weeks		
	No. Housed	No. Died	Mortality (%)	No. Housed	No. Died	Mortality (%)	No. Housed	No. Died	Mortality (%)
S-1	1774	43	2.42	1500	118	7.87	725	104	14.3
S-2	1596	32	2.00	1449	2	0.14	-	-	-

Table 6. Incubation records in last four generations in selected and control populations

Generations	Strains	No. of hatches	No. of eggs set	Fertility (%)	No. of good chicks	Hatchability (%)	
						TES	FES
S-27	IWN	4	8704	97.15	6111	72.13	74.24
	IWP	3	6816	97.11	5082	76.04	78.30
	Control	1	156	91.03	40	28.21	30.99
S-28	IWN	3	6189	93.97	4561	75.20	80.02
	IWP	3	5953	91.01	4076	69.86	76.76
	Control	1	667	85.76	522	79.91	93.18
S-29	IWN	3	5707	84.72	4244	74.55	87.96
	IWP	3	5794	83.44	4081	71.76	86.01
	Control	1	499	80.10	308	64.33	80.25
S-30	IWN	3	6156	88.55	4865	79.60	89.83
	IWP	3	7017	83.64	5110	73.34	87.69
	Control	1	590	84.74	470	90.60	98.75

Mortality

The mortality of IWN and IWP birds during 17-40 weeks of age was well within the specified limit of 1% per month but it slightly exceeded in Control population. Similarly, the mortality of IWN and IWP birds during 17-64 weeks of age was well within the specified limit of 1% per month but it exceeded in Control population (Table 7).

Table 7. Mortality percentage at different ages in last five generations in selected and control populations

Generations	Strains	0-8 wks	9-16 wks	17-40 wks	17-64 wks
S-26	IWN	7.91	3.35	3.21	4.54
	IWP	5.19	3.27	4.48	6.03
	Control	5.67	4.17	1.10	1.10
S-27	IWN	5.27	0.64	3.04	5.32
	IWP	3.93	0.60	4.63	5.83
	Control	22.22	7.14	0	0
S-28	IWN	6.57	7.96	6.26	10.85
	IWP	4.97	0.22	5.00	10.00
	Control	2.87	7.03	5.33	11.33
S-29	IWN	5.3	2.41	2.38	6.34
	IWP	5.8	1.39	3.98	5.18
	Control	5.4	3.82	7.62	12.38

Production performance

Least square means for different economic traits up to 64 weeks of age in both selected strains (IWN and IWP) and in control population during the S-29 generation are presented in Table 8. The hen housed egg production up to 64 weeks of age in S-29 generation decreased by 1.8 eggs in IWN strain while it remained almost same in IWP strain as compared to previous generation. Similarly, survivors' egg production up to 64 weeks of age decreased by 2.2 in IWN and marginally increased by 0.6 eggs in IWP strains in S-29 generation when compared to previous generation. Hen housed egg production up to 72 weeks of age was 301.2 and 304.1 eggs in IWN and IWP strains respectively which again decreased by 1.6 and 4.2 eggs respectively in IWN and IWP strains over previous generation.

Egg number

The birds in S-29 generation have completed the performance evaluation up to 64 weeks of age during the period under report (Table 9). The phenotypic response realized in S-29 generation for hen-housed, hen-day and survivors egg production up to 64 weeks of age were -1.73, -0.99 and -2.19 eggs in IWN strain (Response was negative).

Table 8. Egg production to 64 weeks of age over last five generations in different strains

Generations	IWN			IWP			Control		
	HH64	HD64	Sur64	HH64	HD64	Sur64	HH64	HD64	Sur64
S-25	261.3	266.1	267.5	250.6	256.4	257.9	213.2	218.1	218.9
S-26	251.4	259.4	261.2	254.1	261.2	262.9	210.0	212.0	212.1
S-27	264.8	270.8	272.0	255.1	262.2	262.4	218.6	218.6	218.6
S-28	256.7	261.2	263.8	261.3	266.7	268.2	177.6	192.1	194.0
S-29	254.9	260.2	261.6	261.2	267.9	268.8	174.1	184.9	187.9

Table 9. Growth and production performances in S-29 generation of IWN and IWP strains and control layer population

Traits	IWN		IWP		Control	
	N	Mean ± SE	N	Mean ± SE	N	Mean ± SE
Body weight (g)						
16 wks	1009	1050.89 ±2.54	1006	1042.16±2.75	105	1035.10±14.40
40 wks	973	1447.29±5.27	984	1426.56±4.52	96	1374.36±17.03
64 wks	943	1498.16±5.65	948	1486.10±8.22	91	1483.74±23.57
ASM (days)	1009	141.36±0.20	1006	139.89±0.88	105	154.59±0.92
Egg weight (g)						
28 wks	1006	48.00±0.10	983	48.39±0.09	139	44.40±0.85
40 wks	855	52.16±0.10	952	52.13±0.09	142	51.01±0.47
64 wks	803	54.16±0.37	825	53.58±0.11	119	53.92±0.57
EP to 40 wks (Nos.)						
Hen housed	1009	122.74±0.36	1006	121.03±0.40	149	89.15±2.26
Survivors'	988	123.23±0.33	989	124.33±0.79	145	88.21±1.98
Hen day: 17-40 wks	-	123.13		124.12	-	85.99
Hen day: 21-40 wks	-	122.52		123.20	-	86.36
EP to 64 wks (Nos.)						
Hen housed	1009	254.96±1.24	1006	261.25±1.13	105	174.07±6.07
Survivors'	957	261.57±0.83	954	268.79±1.45	94	187.94±4.95
Hen day: 17-64 wks	-	260.17		267.90		184.90
Hen day: 21-64 wks		260.67		267.34		185.94
EP to 72 wks (Nos.)						
Hen housed	335	301.2±2.92	334	304.1±2.56	-	-
Survivors'	316	304.3±2.24	317	307.6±0.78	-	-
Hen day: 17-72wks	-	303.9		307.4	-	-

The respective values for IWP strain were -0.1, 1.2, and 0.57 eggs (Response was positive for hen day and survivors' egg production).

Table 10. ASM and body weights at 64 weeks of age in last five generations in different strains

Generations	IWN		IWP		Control	
	ASM (d)	BW64 (g)	ASM (d)	BW64 (g)	ASM (d)	BW64 (d)
S-25	146.4	1659	143.8	1698	151.9	1636
S-26	138.8	1643	139.4	1731	170.9	1589
S-27	139.0	1547	139.1	1547	145.3	1440
S-28	144.5	1544	139.6	1585	153.1	1580
S-29	141.4	1498	139.9	1486	154.6	1484

Frequency distribution

The frequency of egg production up to 64 weeks of age in IWN and IWP strains in S-29 generation was maximum in the class interval of 261-280 while in control population it was maximum in the class interval of 201-220 (Table 11). The trend is similar to that of earlier generation.

Table 11. Frequency distribution of egg production up to 64 weeks of age in different layer strains (S-29 generation)

Class interval	IWN	IWP	Control
<100	0.018	0.013	0.151
101 - 120	0.011	0.006	0.009
121 - 140	0.006	0.005	0.047
141 - 160	0.009	0.007	0.085
161 - 180	0.019	0.005	0.104
181 - 200	0.015	0.013	0.179
201 - 220	0.031	0.019	0.226
221 - 240	0.089	0.065	0.151
241 - 260	0.237	0.185	0.038
261 - 280	0.377	0.448	0.009
281 - 300	0.189	0.225	0.00
>300	0.005	0.06	0.00

Egg weight

The egg weight at 28 weeks of age decreased marginally in IWN and IWP strains compared to last generation. However, egg weight at 28 and 40 weeks of age slightly increased in IWP line while decreased in IWN line in the present generation as compared to last generation. Egg weight at 64 weeks of age has decreased in both IWN and IWP strains in the present generation (Table 12). In control population there was decrease in egg weight at 28, 40 weeks of age but increased at 64 weeks of age in S-29 generation compared to S-28 generation.

Table 12. Mean egg weights at various ages in last five generations in different layer strains

Strains	Generations	Egg weight (g)		
		28 wks	40 wks	64 wks
IWN	S-25	48.45	51.33	55.73
	S-26	51.48	53.45	54.09
	S-27	48.98	51.91	55.03
	S-28	48.00±0.10	52.16±0.10	54.16±0.37
	S-29	47.33±0.10	52.15±0.10	53.19±0.11
IWP	S-25	48.46	52.76	57.08
	S-26	53.25	55.06	56.63
	S-27	49.74	52.09	56.53
	S-28	48.22±0.09	51.46±0.11	55.3±0.13
	S-29	48.39±0.09	52.13±0.09	53.58±0.11
Control	S-25	45.79	50.03	54.98
	S-26	47.26	51.10	53.13
	S-27	46.60	52.61	54.95
	S-28	48.11±0.28	52.21±0.31	51.11±0.47
	S-29	44.40±0.85	51.01±0.47	53.92±0.57

Heritability estimates

The heritability estimates of egg production up to 40 and 64 weeks of age were very low in IWN line while they were low to moderate in IWP strain during S-29 generation. The heritability estimates of egg weight were low to moderate while those of body weight were in the range of low to high in magnitude (Table 13).

Response to selection

The phenotypic response for hen housed egg production up to 64 weeks of age was negative in both IWN and IWP strains in S-29 generation. Similarly phenotypic response for egg weight at 64 weeks of age was negative in both IWN and IWP strains (Table 14). However, phenotypic response for age at sexual

maturity was negative in IWN strain and positive in IWP strain.

Table 13. Heritability estimates of different traits in IWN and IWP strains in S-29 generation

Strains	Traits	Sire	Dam	Sire + Dam
IWN	ASM	0.061±0.060	0.322±0.125	0.191±0.057
	BW16	0.057±0.151	0.413±0.127	0.492±0.073
	BW40	0.359±0.118	0.183±0.123	0.271±0.064
	BW64	0.413±0.129	0.217±0.128	0.315±0.064
	EW28	0.238±0.095	0.304±0.124	0.271±0.062
	EW40	0.254±0.108	0.249±0.141	0.252±0.068
	EW64	0.144±0.121	0.198±0.203	0.171±0.087
	EP40	0.090±0.066	0.119±0.118	0.104±0.051
IWP	ASM	0.346±0.114	0.231±0.119	0.288±0.063
	BW16	0.408±0.125	0.292±0.121	0.350±0.067
	BW40	0.374±0.120	0.531±0.130	0.452±0.072
	BW64	0.165±0.083	0.000±0.000	0.083±0.050
	EW28	0.138±0.085	0.000±0.000	0.069±0.054
	EW40	0.123±0.087	0.138±0.143	0.131±0.062
	EW64	0.199±0.103	0.000±0.000	0.100±0.061
	EP40	0.209±0.089	0.246±0.119	0.227±0.059
EP64	0.059±0.059	0.266±0.120	0.162±0.045	

Table 14. Phenotypic response in primary and various correlated traits in S-29 generation of IWN and IWP strains

Sl. No.	Traits	IWN	IWP
1	ASM (d)	-3.1	0.24
Body weight (g)			
2	16 wks	14.14	-12.17
3	40 wks	-113.72	-103.77
4	64 wks	-45.84	-98.9
Egg weight (g)			
5	28 weeks	-0.67	0.17
6	40 weeks	-0.01	0.67
7	64 weeks	-0.97	-1.72
Egg number at 40 wks			
8	Hen Housed	0.31	-2.31
9	Hen Day	-0.61	-1.03
10	Survivors	-1.03	-2.12
Egg number at 64 wks			
	Hen Housed	-1.73	-0.1
	Hen Day	-0.99	1.2
	Survivors	-2.19	0.57

The genetic response for hen housed egg production up to 64 weeks of age was positive in both lines and better in IWP line in S-29 generation. However, genetic response (indirect) for egg weight and body weight at 64 weeks of age was negative in both strains in this generation (Table 15). Average genetic response for 64

weeks hen housed egg production was 4.77 and 1.65 eggs respectively in IWN (Figure 1) and IWP (Figure 2) strains during last 10 generations (S-20 to S-29).

Table 15. Genetic gain in primary and various correlated traits in S-29 generation in IWN and IWP strains

Sl. No.	Traits	IWN	IWP
1	Average age at first egg (g)	-4.6	-1.26
2	Body weight at 16 weeks (g)	-6.7	-33.01
3	Body weight at 40 weeks (g)	160.64	170.59
4	Body weight at 64 weeks (g)	-49.81	-2.87
5	Egg weight at 28 weeks (g)	3.04	3.88
6	Egg weight at 40 weeks (g)	1.19	1.87
7	Egg weight at 64 weeks (g)	-3.78	-4.53
8	Egg number at 40 weeks (HH)	0.22	-2.4
9	Egg number at 40 weeks (HD)	3.63	3.21
10	Egg number at 40 weeks (S)	1.7	0.61
11	Egg number at 64 weeks (HH)	1.81	3.44
12	Egg number at 64 weeks (HD)	6.17	8.36
13	Egg number at 64 weeks (S)	3.9	6.66

Supply of germplasm

A total of 102521 day old (commercial) chicks to farmers, 31422 breeding birds to farmers and 3629 culled birds were sold to households. A total of 2800 breeding birds supplied to Institutions (Total germplasm supplied: 136743 Nos.).

Revenue generation

The centre has generated the revenue of Rs. 64.255 lakhs, which was 194.72% of the recurring expenditure on feed (Rs. 32.998 lakhs).

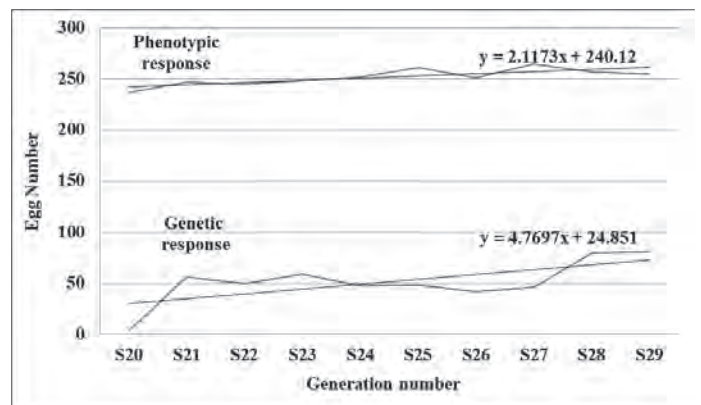


Fig. 1. Phenotypic and genetic response to egg production up to 64 weeks of age in IWN strain at Mannuthy centre

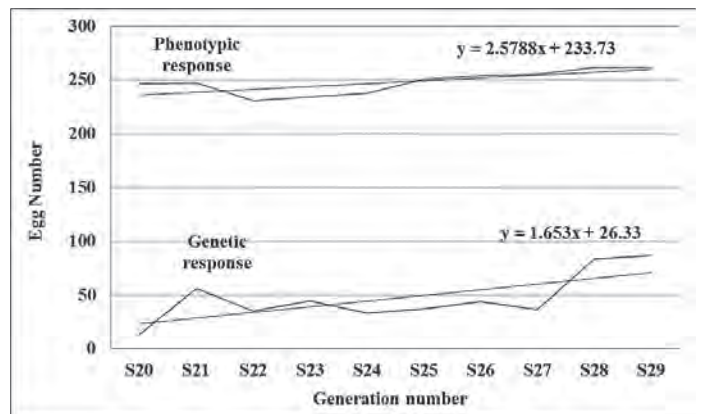


Fig. 2. Phenotypic and genetic response to egg production up to 64 weeks of age in IWP strain at Mannuthy centre

Anand Agricultural University, Anand

Programme activity assigned

- Conservation, characterization and improvement of native chicken germplasm.
- The egg production up to 64 weeks of age will continue to be the selection criterion in IWN and IWP strains; the target set is 305 eggs up to 72 weeks of age for crosses, which is to be achieved by the end of XII plan.
- The centre will maintain all the surviving birds of first hatch to record egg production till 72 weeks of age.
- To participate with IWN X IWP cross in RSPP tests being conducted by Govt. of India each year.
- To produce and evaluate crosses with native chicken under farm and field conditions.
- To develop location specific chicken varieties and their dissemination for village poultry.

Action taken

- During the period under report, the S-0 generation of native and RIR breed were evaluated up to 40 weeks of age.
- The F1 cross (IWN X Native) and the F1 X RIR crosses were evaluated up to 64 weeks of age.
- the S-1 generation of native and RIR breed as well as the F1 cross (IWN x Native) and Terminal Cross (F1 X RIR) were produced and evaluated up to 16 weeks of age.
- The S-13 generation of IWN and IWP strains along with a control layer population was evaluated up to 64 weeks of age.
- The centre maintained and evaluated S-5 generation of IWD and IWK strains up to 64 weeks of age.
- Hatching of S-14 generation of IWN and IWP strains and control population as well as S-6 generation of IWD and IWK strains was initiated.

Details of the implementation of programme and results achieved

A. Development of location specific rural germplasm (egg type)

Evaluation of native germplasm

As per the new objectives of AICRP on Poultry Breeding that is being reoriented towards rural

poultry, the breeding programme was started for the improvement and utilization of native birds. During the reporting period, chicks of S-0 generation of native birds and RIR birds and their two way and three way crosses were evaluated up to 40 weeks of age.

Production performance in native chicken and RIR breed

Production performance of native and RIR in S-0 generation was evaluated up to 40 weeks of age (Table 16). Age at sexual maturity (ASM) was lesser in native chicken as compared to RIR. However, egg production up to 40 weeks of age was higher in native chicken as compared to RIR. Egg weight and body weights were higher in RIR than native chickens. Feed consumption during 17-40 weeks of age was somewhat higher in RIR as compared to native chickens. Mortality during 17-40 weeks of age was lesser in both genotypes.

Table 16. Production performance of native and RIR breeds of chicken in S-0 generation

Traits	N	Native (S-0)	N	RIR (S-0)
Body weight (g) at				
40 wks	430	1471±9.8	384	1763±7.0
ASM (days)	512	159.9±0.46	443	172.3±0.54
Egg production (Nos.)				
40 wks	430	74.1±0.94	384	62.6±0.95
Egg weight (g)				
28 wks	452	36.98±0.14	340	46.17±0.17
40 wks	305	44.83±0.16	349	54.87±0.15
Mortality (%)				
17- 40 wks	-	2.75	-	3.72
Total feed consumption per bird (kg)				
17- 40 wks	-	17.5	-	18.5

Production performance in F₁ and terminal crosses

Production performance of F1 (IWN x Native) cross and three way cross also called as terminal cross (TC=F₁ x RIR) were evaluated for production performance up to 64 weeks of age. (Table 17). Body weight at 16, 40 and 64 weeks of age was higher in TC as compared to F₁ cross. Feed consumption during 17-40 weeks of age was somewhat higher in RIR as compared to native chickens. Mortality during 17-40 weeks of age was lesser in both genotypes.

Table 17. Performance of F₁ and (F₁ X RIR) at farm and field conditions

Sl. No.	Traits	N	F ₁ (IWN x Native)	N	Farm Testing TC (F ₁ x RIR)	Field Testing* TC (F ₁ x RIR)
Body weight on pooled sex (g)						
1	0 day	-	31.7±0.13	-	36.2±0.21	35.5±0.37
2	4 wks	-	143.4±1.42	-	217.6±2.15	211.3±3.26
3	8 wks	-	535.3±5.42	-	614.8±4.65	354.9
Body weight at 20 weeks of age (g)						
4	Female	-	1337 ±12.1	-	1526±14.8	1250
5	Male	-	1545 ± 8.87	-	1641±21.6	1487
Pullets housed (Nos.)			160	-	141	96
6	ASM (d)	158	142.79±0.59	141	140.5 ± 0.56	160 (First egg)
7	16 wks	160	1068 ±9.23	141	1245 ±11.71	-
8	40 wks	137	1411 ±19.41	137	1577 ±17.02	1250
9	64 wks	130	1712 ±23.83	135	1735 ±14.53	1555
Egg production (Nos.)						
10	40 wks	137	92.72±2.11	137	90.08±1.55	61.30
11	64 wks	130	181.02±5.12	125	182.33±3.66	-
Egg weight (g)						
12	28 wks	129	43.50±0.27	99	39.47±0.38	-
13	40 wks	108	44.43±0.25	104	46.76±0.33	42.80
14	64 wks	97	49.35±0.50	73	48.72±0.43	-
Feed consumption per bird (kg)						
15	0-8 wks		1.59		1.60	-
16	9-16 wks		3.62		3.55	-
17	17-40 wks		17.75		17.38	-
18	17-64 wks		35.87		37.25	-
Mortality (%)						
19	0-8 wks		7.19		3.00	2.50
20	9-16 wks		0.69		0.00	2.00
21	17-40 wks		11.25		1.42	14.58
22	17-64 wks		18.75		2.84	-

* Deep Litter

Incubation records

Incubation and hatching results of native, RIR and their crosses are presented in Table 18. Compared to previous generation, fertility (-3.11%) and hatchability (-2.94 and 0.35% on TES and FES) in native chicken has come down in S-1 generation. Similarly in RIR fertility (-4.6) has come down but hatchability (1.81 and 5.9

on TES and FES) has increased. Among two way cross (F₁=IWN X Native) and three way (Terminal) cross (F₁x RIR) better fertility was observed but hatchability has come down considerably compared to previous generation.

Table 18. Summary of incubation and hatching results of native chicken, RIR and crosses

Generation	No. of hatches	Eggs set (Nos.)	Fertile eggs (Nos.)	Fertility (%)	Total chicks (Nos.)	Good chicks (Nos.)	Hatchability (%)	
							TES	FES
Native chicken								
S-0	1	2831	2429	85.80	2072	-	73.19	85.30
S-1	2	2363	1954	82.69	1660	1552	70.25	84.95
RIR								
S-0	1	2463	2260	91.75	1636	-	66.42	72.39
S-1	2	2685	2340	87.15	1832	1780	68.23	78.29
F₁ (IWN X Native)								
2015-16	1	1204	1034	85.88	781	-	64.87	75.53
2016-17	1	950	868	91.37	581	579	61.16	66.94
TC (F₁ X RIR)								
2015-16	1	3245	2845	87.67	2597	-	80.03	91.28
2016-17	1	760	671	88.29	532	527	70.00	79.28

Growth performance

Native and RIR chickens in S-1 generation were evaluated for growth traits up to 16 weeks of age (Table 19). Body weights recorded at different interval except at day old age have increased in both native chickens and RIR breed in S-1 generation as compared to previous generation. Feed consumption per bird during 0-8 and 9-16 weeks of age was by and large similar to those recorded in previous generation. Mortality during 0-8 and 9-16 weeks of has although come down compared to previous generation but still higher than acceptable level in native chicken. RIR breed mortality has come down during 0-8 weeks but went up during 9-16 weeks of age but they are under acceptable level.

Performance of F₁ and F₁ X RIR cross evaluated up to 16 weeks of age during the reporting period of 2016-17 (Table 20). Performance of F₁ X RIR cross with respect to body weight was better than F₁ (IWN X Native) in the present generation as well. However, body weight of both crosses recorded different ages has come down in the present generation. Feed consumption per bird of both crosses during 0-8 and 9-16 weeks of age was almost similar to those recorded in previous generation. Mortality during 0-8 and 9-16 weeks of age was within the permissible limit in both crosses. However, it was on higher side in IWN X native cross (9-16 weeks of age).

Table 19. Growth performance of native and RIR breeds of chicken in last two generations

Traits	N	Native (S-1)	Native (S-0)	N	RIR (S-1)	RIR (S-0)
Body weight (g)						
day old	200	30.8± 0.21	31.4±0.53	200	38.3± 0.29	39.8±0.17
4 wks	100	170.5±3.16	151.3±4.58	100	189.3±2.34	171.0±5.58
8 wks	100	463± 8.11	351±1.58	100	536 ±10.19	396±1.59
16 wks	422	1005±7.58	916 ± 5.39	564	1218 ± 6.57	1116 ± 5.23
20 wks	-	-	1115 ± 5.6	-	-	1397 ± 5.2
Total feed consumption per bird (kg)						
0-8 wks	-	1.57	1.40	-	1.61	1.59
9-16 wks	-	3.32	3.39	-	3.46	3.46
Mortality (%)						
0-8 wks	-	7.15	9.88	-	2.03	6.22
9-16 wks	-	5.83	7.89	-	6.42	4.66

Table 20. Performance of F₁ and (F₁ X RIR) at farm conditions in last two generations

Traits	N	(IWN x Native) F ₁ (2016-17)	(IWN x Native) F ₁ (2015-16)	N	(F ₁ x RIR) TC (2016-17)	(F ₁ x RIR) TC (2015-16)
Body weight on pooled sex (g)						
0 day	100	30.84 ± 0.34	31.7 ± 0.13	100	39.78± 0.40	36.2 ± 0.21
4 wks	100	158.1 ± 3.27	143.4 ± 1.42	100	196.4± 3.79	217.6 ± 2.15
8 wks	100	420 ± 12.4	535.3 ± 5.42	100	601 ± 12	615 ± 4.65
16 wks	170	983 ±13.96	-	150	1223± 15.2	-
Body weight at 20 weeks of age (g)						
Female		-	1337 ±12.1		-	1526 ± 14.8
Male		-	1545 ± 8.87		-	1641 ± 21.6
ASM (d)		-	142.8 ± 0.59		-	140.5 ± 0.56
Feed consumption per bird (kg)						
0-8 wks		1.55	1.59		1.63	1.60
9-16 wks		3.47	3.62		3.49	3.55
Mortality (%)						
0-8 wks		4.15	7.19		0.82	3.00
9-16 wks		15.6	0.69		3.92	0.00

TC: Terminal cross

B. Improvement of IWN and IWP strains of White Leghorn

The centre has evaluated the S-13 generation of IWN and IWP strains up to 64 weeks of age during the year 2016-2017. Hatching programme for S-14 generation of IWN and IWP strains and control population was initiated.

Selection records

The summary of selection records of IWN and IWP strains during last five generations is presented in Table 21.

Table 21. Summary of selection records of IWN and IWP strains during last five generations

Strains	Generations	Sires	Dams	Ne	SD in females	SI (σ)
IWN	S-8	50	270	169	28.96	1.150
	S-9	50	239	165	16.63	0.311
	S-10	50	269	169	17.35	0.619
	S-11 to S-12	50	262	168	11.40	0.41
	S-12 to S-13	50	249	166.6	15.70	0.486
IWP	S-8	50	276	169	31.48	1.157
	S-9	50	256	167	20.92	0.560
	S-10	50	266	168	18.10	0.594
	S-11 to S12	50	271	169	3.98	0.13
	S-12 to S-13	50	241	165.6	15.70	0.406

Incubation records

The fertility has increased in selected strains as well as control population compared to previous generation. Hatchability both on total and fertile eggs set has increased in selected lines but declined in control

population as compared to previous generation. Overall fertility and hatchability in selected strains were better than control population in this generation (Table 22).

Table 22. Consolidated incubation records in last four generations

Generations	Strains	Eggs set (Nos.)	Fertility (%)	Hatchability (%)	
				TES	FES
S-10	IWN	6977	84.17	61.01	72.48
	IWP	6370	84.84	67.11	79.10
	Control	556	75.89	65.64	86.49
S-11	IWN	6451	90.11	69.43	77.05
	IWP	6241	89.71	70.74	78.85
	Control	327	78.28	56.26	71.87
S-12	IWN	5543	72.48	51.20	70.63
	IWP	5329	71.63	56.56	78.96
	Control	555	83.60	71.53	85.56
S-13	IWN	3325	90.16	66.34	73.58
	IWP	3192	92.24	76.91	83.38
	Control	720	86.11	56.25	65.32

Mortality

The mortality figures of both selected and control populations during the last three generations are summarized in Table 23. Mortality during 17-40 weeks of age was exceeded the acceptable limit of 1% mortality per month. However, mortality during 41-64 weeks and 17-64 weeks of age has come down and overall it was within acceptable limit of 1% month in all three lines in S-13 generation and it was lesser than S-12 generation. Major cause of mortality in IWN and IWP strains was LPAI during 17-40 weeks of age and it was egg peritonitis during 17-64 weeks of age in S-13 generation.

Table 23. Percent mortality during last three generations

Generations	Strains	0-8	9-16	17-40	41-64	17-64
S-11	IWN	2.51	2.73	7.23	6.58	13.34
	IWP	2.80	4.14	19.18	11.05	28.11
	Control	2.19	2.82	5.26	0.00	5.26
S-12	IWN	4.21	2.67	3.12	9.15	11.98
	IWP	4.74	3.57	3.44	11.96	14.98
	Control	3.78	3.19	2.31	10.65	12.72
S-13	IWN	4.56	0.83	7.15	2.69	9.65
	IWP	5.04	1.71	8.01	2.36	10.18
	Control	2.96	1.97	8.09	2.52	10.40

Growth performance

The growth performance of IWN, IWP and control populations in S-13 generation is presented in Table 24. Body weight at 64 weeks of age was lesser in IWN as compared to IWP strain and control population.

Production performance

Egg production up to 40 weeks of age was higher in IWN strain as compared to IWP and control population. Similarly, egg production up to 64 and 72 weeks of age was higher in IWN than IWP strain and 64 weeks egg production in both selected strains was higher than control population (Table 23). However, egg production up to 40 and 64 weeks of age in selected strains was lesser in S-13 generation as compared to previous

Table 24. Performance of IWN and IWP strains and Control population in S-13 generation

Traits	N	IWN	N	IWP	N	Control
No. of pullets housed		601		599		173
ASM (days)	587	148.6 ± 0.43	589	150.9 ± 0.40	172	157.2 ± 0.67
Body weight (g)						
16 wks	601	1121 ± 4.77	599	1169 ± 4.62	173	1001 ± 10.84
40 wks	557	1608 ± 8.76	544	1587 ± 8.43	161	1501 ± 16.53
64 wks	534	1668 ± 9.76	530	1740 ± 8.75	158	1708 ± 18.36
72 wks	373	1825 ± 13.90	401	1810 ± 12.05		-
Egg production up to 40 weeks (Nos.)						
Survivors	557	107.87±0.90	544	103.63±0.98	150	84.05 ± 1.73
Hen housed	601	98.25±1.36	599	93.24±1.40	173	76.95±2.13
Hen day	557	102.23	544	97.83	161	79.29
Egg production up to 64 weeks (Nos.)						
Survivors	534	240.5±1.75	530	228.3±2.09	146	191.7±3.72
Hen housed	601	211.05±3.17	599	197.87±3.26	173	169.45±5.14
Hen day	534	226.73	530	214.52	158	180.21
Egg production up to 72 weeks (Nos.)						
Survivors	373	280.0±2.32	401	268.6±2.13	-	-
Hen housed	434	233.48±3.54	452	219.46±3.60	-	-
Hen day	373	257.95	401	240.48	-	-
Egg weight (g)						
28 wks	531	50.24±0.20	521	50.36±0.21	148	49.61±0.26
40 wks	516	52.10±0.07	496	52.73±0.12	123	51.66±0.29
64 wks	458	53.37±0.23	423	55.31±0.20	100	55.64±0.33
72 wks	301	54.09±0.19	288	55.63±0.19		-
Feed consumption/bird (kg)						
0-8 wks	-	1.59	-	1.62	-	1.60
9-16 wks	-	3.51	-	3.56	-	3.53
17-40 wks	-	17.4	-	17.0	-	18.7
17-64 wks	-	37.9	-	37.5	-	36.5
17-72 wks	-	44.6	-	44.2	-	-
Mortality (%)						
0-8 wks		4.56		5.04		2.96
9-16 wks		0.83		1.71		1.97
17-40 wks		7.15		8.01		8.09
17-64 wks		9.65		10.18		10.44
17-72 wks		12.90		11.73		-

generation. Similarly, 72 weeks egg production was lesser in both strains in S-13 generation as compared to preceding generation (Table 25).

Feed consumption

Feed consumption from 17-64 weeks of age in IWN and IWP strains were similar to that of control population. Feed consumption from 16-72 weeks of age in both selected lines was almost similar (Table 23).

Table 25. Egg production over last five generations

Traits	Generations	IWN	IWP	Control
EP40	S-9	118.8	112.6	97.1
	S-10	118.7	115.5	89.63
	S-11	119.3	116.6	103.4
	S-12	127.4	121.2	104.0
	S-13	98.25	93.24	76.95
EP64	S-9	244.7	229.7	193.3
	S-10	250.0	243.6	197.04
	S-11	259.6	254.6	218.6
	S-12	253.1	243.6	206.1
	S-13	211.05	197.87	169.45
EP72	S-9	284.9	270.4	223.5
	S-10	288.3	277.2	-
	S-11	301.8	300.3	-
	S-12	294.2	275.0	-
	S-13	233.5	219.5	-

Age at sexual maturity and egg weight

Egg weight of IWN, IWP and control population at 40 weeks of age in S-13 generation was lesser than those recorded in S-12 generation. However egg weight of IWN, IWP and control population at 64 weeks of age in S-13 generation was better than those recorded in S-12 generation (Table 26).

Table 26. Mean age at sexual maturity and egg weight in last five generations

Traits	Generations	IWN	IWP	Control
ASM	S-9	144.5	151.0	150.42
	S10	137.1	139.1	155.5
	S-11	145.3	144.9	151.1
	S-12	138.3	141.9	144.7
	S-13	148.6	150.9	157.2
EW40	S-9	50.30	51.50	50.68
	S10	51.30	52.64	51.92
	S-11	52.21	53.10	51.53
	S-12	53.57	54.49	54.79
	S-13	52.10	52.73	51.66
EW64	S-9	51.88	53.34	54.84
	S10	52.37	53.58	53.08
	S-11	54.24	55.61	55.30
	S-12	52.83	52.76	54.58
	S-13	53.37	55.31	55.64

Frequency distribution

The frequency of egg production up to 64 weeks of age in S-13 generation was maximum in the class interval of 251-260 in IWN and 261-270 in IWP strains (Table 27).

Table 27. Frequency distribution of egg production up to 64 weeks of age in S-13 generation

Class Interval	IWN		IWP	
	No	%	No	%
<151	62	11.61	84	15.85
151-160	7	1.31	4	0.75
161-170	6	1.12	7	1.32
171-180	9	1.69	9	1.70
181-190	13	2.43	12	2.26
191-200	12	2.25	19	3.58
201-210	21	3.93	25	4.72
211-220	19	3.56	28	5.28
221-230	34	6.37	48	9.06
231-240	40	7.49	48	9.06
241-250	58	10.86	59	11.13
251-260	79	14.79	59	11.13
261-270	74	13.86	65	12.26
271-280	56	10.49	51	9.62
281-290	34	6.37	10	1.89
291-300	10	1.87	2	0.38
Total	534	100.00	530	100.00

Heritability of the traits

Heritability estimates for different traits studied up to 64 weeks of age in S-12 generation are presented in Table 28. It was observed that heritability estimates were in the range of very low to moderate in magnitude for all the traits.

Table 28. Heritability estimates of different traits up to 64 weeks of age (Sire component) in S-13 generation

Traits	Strain	
	IWN	IWP
ASM	0.162±0.116	0.034±0.102
BW16	0.026±0.095	*
BW40	0.038±0.097	*
BW64	*	0.224±0.131
EP40	0.191±0.121	0.124±0.116
EP64	0.192±0.121	0.241±0.132
EW28	0.152±0.122	0.156±0.132
EW40	*	*
EW64	*	*

Genetic and phenotypic response

Average genetic response for 64 weeks hen housed egg production was 0.43 and 0.78 eggs respectively in IWN (Figure 3) and IWP (Figure 4) strains during last 10 generations (S-4 to S-13). However phenotypic response for 64 weeks hen housed egg production was -2.82 and -2.48 respectively in IWN (Figure 3) and IWP (Figure 4) strains

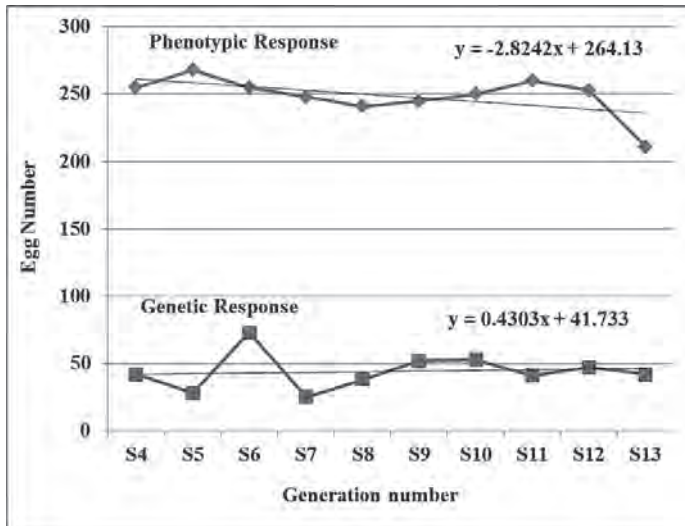


Fig. 3. Phenotypic and Genetic response to egg production up to 64 weeks of age in IWN strain at Anand centre

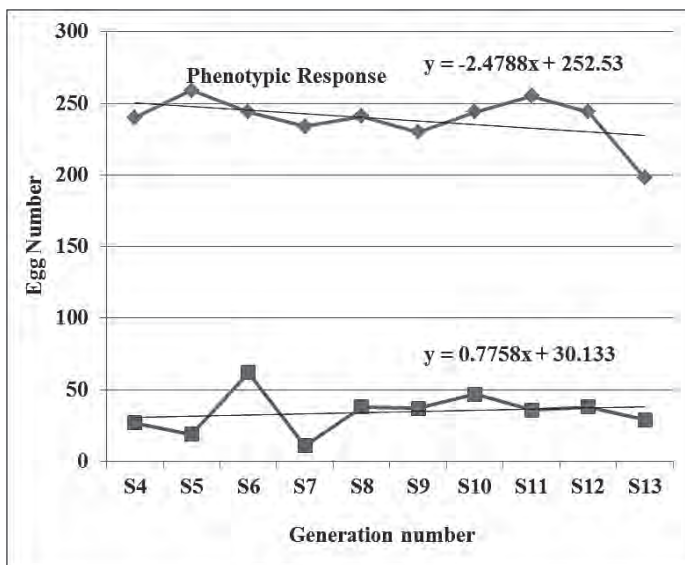


Fig. 4. Phenotypic and Genetic response to egg production up to 64 weeks of age in IWP strain at Anand centre

Performance of IWD and IWK strains

Performance of IWD and IWK strains in S-5 generation is presented in Table 29. Body weight at 16, 40 and 64 weeks of age was higher in IWD as compared to IWK strain. Age at sexual maturity in IWD strain was lesser than that of IWK strain. The egg production up to 40 and 64 weeks of age was almost similar in IWD and IWK strain. Egg weight was better in IWD strain

as compared to IWD strain recorded at 28, 40 and 64 weeks of age. Feed consumption was almost similar in both strains during 17-40 and 17-64 weeks of age. Mortality was higher than the accepted limit of 1% per month during 17-40 as well as 17-64 weeks of age in both strains.

Table 29. Performance of IWD and IWK strains in S-5 generation

Traits	N	IWD	N	IWK
No. of pullets housed	-	200	-	200
ASM (days)	193	143.88 ± 0.58	188	148.17 ± 0.62
Body weight (g)				
16 wks	200	1140±6.46	200	1045±7.28
40 wks	168	1538±16.01	182	1408 ±14.68
64 wks	163	1637±17.64	176	1570 ±19.64
Egg production up to 40 wks (Nos.)				
Survivors'	159	87.97±2.79	173	86.17±1.91
Hen Day	200	73.63±3.06	200	78.74±2.28
Hen Housed	168	83.87	182	82.54
Egg production up to 64 wks (Nos.)				
Survivors'	152	191.20±5.69	164	192.07±4.13
Hen Day	200	151.14±6.69	200	168.56±5.22
Hen Housed	163	180.50	176	181.21
Egg weight (g)				
28 wks	132	49.04±0.17	153	49.26±0.20
40 wks	122	51.24±0.21	149	52.15±0.23
64 wks	102	53.42±0.41	143	56.54±0.40
Feed Consumption/bird (kg)				
0-8 wks	-	1.61	-	1.56
9-16 wks	-	3.47	-	3.514
17-40 wks	-	17.9	-	17.3
17-64 wks	-	37.9	-	37.7
Mortality (%)				
0-8 wks	-	4.77	-	3.64
9-16 wks	-	1.98	-	0.82
17-40 wks	-	16.50	-	9.50
17-64 wks	-	19.00	-	12.50

Regeneration of IWD and IWK strains

The S-6 generation of IWD strain was generated by mating of 38 sires with 152 dams with mating ratio of 1:4 while S-6 generation of IWK strain was generated by mating of 40 sires with 160 dams with mating ratio of 1:4. In this generation, the percent fertility was better in IWK strain as compared to IWD strain. Similarly, higher hatchability both on fertile and total egg set was observed in IWK as compared to

IWD strain (Table 30). Fertility in IWD strain was somewhat lesser in S-6 generation as compared to S-5 generation. However, hatchability of IWD strain increased. In IWK strain both fertility and hatchability decreased in S-6 generation as compared to S-5 generation.

Table 30. Summary of incubation and hatching of IWD and IWK Strains in S-6 generation

Sr. No.	Traits	S-6 generation		S-5 generation	
		IWD	IWK	IWD	IWK
1	No. of hatches	2	2	1	1
2	No. of eggs set	996	1268	1011	932
3	No. of fertile eggs	897	1167	925	872
4	Fertility (%)	90.06	92.03	91.49	93.56
	Good chicks hatched (Nos.)	637	838	-	-
5	Total chicks hatched (Nos.)	656	885	648	708
Hatchability (%)					
6	TES	65.86	69.79	64.09	75.97
7	FES	73.13	75.84	70.05	81.20

Germplasm supply

The centre supplied a total of 39474 number of germplasm during 2016-17 which was lesser than germplasm during the previous year (44,337).

Revenue generation

The centre has generated revenue of 26.715 lakhs which is 76.78% of the expenditure on feed cost (34.79 lakhs).

Karnataka Veterinary, Animal and Fishery Sciences University, Bengaluru

Programme activity assigned

- Evaluation and selection of local native chicken germplasm
- To improve PB-1 and PB-2 lines for the development of sire and dam lines for broiler production.
- To evaluate the control population received from DPR to measure environmental trend.

Action taken during 2016-17

- Centre completed purification of local indigenous germplasms and initiated evaluation of growth and production performance.
- The body weight of indigenous germplasm at day old and 8 weeks were recorded.
- Production traits of PB-1, PB-2 and Control lines were evaluated for S-8 and S-21 generation, respectively.
- The S-9 and S-22 generations of PB-1 and PB-2 along with Control lines were regenerated and evaluated for juvenile traits.
- Center also participated in RSPT, 2016 at Gurgaon.

Details of the implementation of programme and results achieved

During the current year, centre completed the purification of local indigenous chicken. Performance evaluation of local indigenous chicken germplasm was initiated. The body weight of indigenous germplasm at day old and 8 weeks was recorded. During the current year, production traits of of PB-1(S-8), PB-2 (S-21) and Control lines were evaluated. PB-1 (S-9) and PB-2 (S-22) along with control lines were regenerated and evaluated for juvenile traits. Center also participated in RSPT, 2016 at Gurgaon.

Collection, conservation and evaluation of native germplasm

Purification of native chicken germplasm was completed as per the technical programme. The solid black colored and pure white plumage birds were culled and uniform attractive plumage colored birds were retained. S-1 generation of native chicken was hatched for evaluation of growth and production performance. A total of 1317 day old chicks were

evaluated. The average body weight of day old and 8 week chicks of native chicken was 30.43 and 477.84±3.14 (1267)g, respectively. The feed efficiency at 0-8 week was 3.10. The overall survivability percentage was 96.20 in 0-8 weeks.

Conservation and utilization of elite germplasm

Selection records

The number of sires and dams contributed to next generation were 64 and 512 in PB-1 while 58 and 464 in PB-2, respectively. The effective number of parents was 227 in PB-1 and 210 in PB-2. The rate of inbreeding was 0.002 and 0.0024 in PB-1 and PB-2 populations, respectively. The average selection differentials were 176 and 158 g in PB-1 and PB-2, respectively. The intensity of selection achieved was 1.54 and 1.48 for PB-1 and PB-2 populations, respectively. Summary of selection records for PB-1 and PB-2 are presented in Table 31 and 32, respectively.

Table 31. Summary of selection records for PB-1

Parameters	S-8	S-9
Sires used	64	64
Dams used	509	512
Sires contributed	55	58
Dams contributed	439	507
Effective number	264.4	227
Rate of Inbreeding	0.001	0.002
SD for male (g)	232.14	273
SD for female (g)	95	79
Average selection differential (g)	104.12	176
Effective selection differential (g)	181.89	214
Selection intensity (σ)	1.52	1.54

Table 32. Summary of selection records for PB-2

Parameters	S-21	S-22
Sires used	58	58
Dams used	449	464
Sires contributed	56	58
Dams contributed	433	457
Effective number	251.23	210
Rate of Inbreeding	0.008	0.0024
SD for male (g)	188.42	235
SD for female (g)	82.43	81
Average selection differential	91.18	158
Average Effective selection differential	164.18	184
Selection intensity (σ)	1.64	1.48

In PB-1 and PB-2, the average selection differential increased indicating more variability in the population but selection intensity decreased marginally in PB-2 as compared to previous generation.

Incubation records

The fertility and hatchability records for the PB-1, PB-2 and Control populations are presented in Table 33. During the current year a total of 3161, 1953 and 94 good chicks were hatched in PB-1, PB-2 and control populations, respectively. The percent fertility was 91.34, 88.98 and 57.14 in PB-1, PB-2 and control, respectively. In PB-1 there was increase in percent fertility as well as hatchability. In PB-2 fertility and hatchability percent remained static as compared to last generation. In Control population fertility and hatchability decreased considerably as compared to last generation.

Table 33. Incubation records for PB-1, PB-2 and control line

Generations	Eggs set (No.)	Fertility (%)	Good chicks (No.)	Hatchability (%)	
				TES	FES
PB-1					
S-8	4326	88.37	3214	77.30	87.47
S-9	3925	91.34	3161	83.03	90.91
PB-2					
S-21	4098	89.29	3134	78.43	87.84
S-22	2569	88.98	1953	77.85	87.49
Control					
S-21	185	84.86	129	71.35	84.08
S-22	210	57.14	94	45.71	80.00

Mortality

The mortality in the present generation during 0 to 5 weeks was 0.89, 1.18 and 1.02% in PB-1, PB-2, and Control line, respectively. Mortality at 0-5 wk decreased in PB-1, and PB-2 compared to previous generation. Low mortality in juvenile phase shows better management of flock health (Table 34).

Table 34. Mortality for PB-1, PB-2 and control line

Generations	0-5 wk	6-16 wk	17-40 wk
PB-1			
S-8	1.56	1.86	3.01
S-9	0.89	1.18	NC
PB-2			
S-21	1.50	0.78	1.74
S-22	1.18	2.80	NC
Control			
S-21	0.78	0.78	0.00
S-22	1.02	1.96	NC

NC -Not completed, NR- Not reported

Body weight and feed efficiency

The day old body weight recorded in PB-1, PB-2 and control lines were 39.86, 40.08 and 40.05 g, respectively. Corresponding values at 5week of age were 1046.35±2.89, 1017.89±3.73 and 719.85±15.21 g, respectively. The body weight at day old and 5 week of age increased in PB-1 but it decreased in PB-2 and control lines as compared to previous generation. In the current year, Feed Conversion Ratio showed marginal improvement in PB-1 over previous generation whereas decreased trend was observed in PB-2 and Control lines as compared to previous year (Table 35).

Table 35. Juvenile traits over last two generations in PB-1, PB-2 and Control line

Generations	Body weight (g)		Feed Efficiency (0-5 wks)
	D1	5wk	
PB-1			
S-8	44.25 ± 0.24 (3214)	1041 ±2.77 (3164)	2.16
S-9	39.86 (3161)	1046.35±2.89 (3133)	2.13 (3133)
PB-2			
S-21	44.10 ±0.26 (3134)	1171±2.71 (3087)	2.03
S-22	40.08 (1953)	1017.89±3.73 (1930)	2.25
Control			
S-21	34.72±0.22 (128)	814±11.51 (128)	2.57
S-22	40.05 (94)	719.85±15.21(92)	2.71

Production performance

The production performance in PB-1, PB-2 and Control lines up to 52 weeks of age over last two generations have been compiled and presented in Tables 36, 37 and 38. In the current year the body weight at 20 week of age decreased in all three lines.

Table 36. Adult body weight at 20 and 40wks of females in different lines

Generations	Body weight (g)	
	20 wk s	40 wks
PB-1		
S-8	2470±12.04 (830)	3191.69±14.75 (500)
S-9	2228.55±12.04 (830)	NC
PB-2		
S-21	2297.61±14.17 (913)	3253.31±27.42 (157)
Control		
S-21	1850±24.83 (49)	2850±35.18 (48)

The ASM recorded in S-8 of PB-1 and S-21 of PB-2 and Control lines were 181.16 ± 0.38 , 180.78 ± 0.50 and 187.37 ± 1.90 days, respectively. Decrease of ASM was observed in PB-1 (S-8) but it increased in case of PB-2 and Control line in S-21 generation as compared to previous generation. Centre needs to record 52 weeks body weight.

Table 37. Age at sexual maturity and egg weight in different lines

Generations	ASM (days)	Egg wt (g) at 32 wks
PB-1		
S-7	183.57 ± 0.40 (512)	58.07 ± 0.23 (360)
S-8	181.16 ± 0.38 (512)	56.88 ± 0.28 (350)
PB-2		
S-20	177.64 ± 0.51 (512)	56.72 ± 0.20 (380)
S-21	180.78 ± 0.50 (464)	56.42 ± 0.33 (320)
Control		
S-20	183.60 ± 2.00 (45)	52.48 ± 0.52 (50)
S-21	187.37 ± 1.90 (48)	51.85 ± 1.02 (48)

The average egg production at 40 weeks of age (survivor basis) in PB-1, PB-2 and Control lines were 68.71 ± 0.46 (500), 53.27 ± 0.50 (438), 64.23 ± 2.30 (48) eggs, respectively. Corresponding values at 52 weeks of age were 115.61 ± 0.66 (482), 91.60 ± 0.72 (438) and 99.31 ± 2.47 (32) eggs, respectively. The egg production at 40 and 52 weeks of age increased in PB-1 (S-8 generation) as compared to previous generation. In PB-2 and Control lines the egg production at 40 and 52 decreased in S-21 generation as compared to previous generation.

Table 38. Production performance of females

Generations	Egg production 40 wks	Egg production 52 wks
PB-1		
S-7	62.60 ± 0.33 (509)	114.94 ± 0.48 (487)
S-8	68.71 ± 0.46 (500)	115.61 ± 0.66 (482)
PB-2		
S-20	60.69 ± 0.60 (449)	100.61 ± 0.93 (423)
S-21	53.27 ± 0.50 (438)	91.60 ± 0.72 (438)
Control		
S-20	67.46 ± 2.43 (45)	115.74 ± 2.53 (43)
S-21	64.23 ± 2.30 (48)	99.31 ± 2.47 (32)

Heritability

The heritability (h^2) of the body weight at 5th week in S-22 generation of PB-2 was 0.0098 ± 0.03 .

Response

The average phenotypic and genetic response of body weight at 5 week over 9 generations in PB-1 was 6.43 and 5.34 g, respectively. Corresponding values for egg production up to 40 weeks of age over 8 generations in PB-1 was -0.59 and -1.10 eggs. The average phenotypic and genetic response of body weight in PB-2 at 5 week over 10 generations was 8.97 and 7.33 g, respectively. Corresponding values for egg production in PB-2 up to 40 week over 10 generations was -1.01 and -1.68 eggs (Table 39). The phenotypic as well as genetic response of primary traits decreased in PB-1 and PB-2 (Fig. 5-8).

Table 39. Genetic and phenotypic response to 5 week body weight and 40 week egg production in PB-1 and PB-2

Trait	PB-1		PB-2	
	Phenotypic response	Genetic response	Phenotypic response	Genetic response
5 weeks body weight (g)	6.43	5.34	8.97	7.33
EP40 (eggs)	0.59	-1.10	-1.01	-1.68

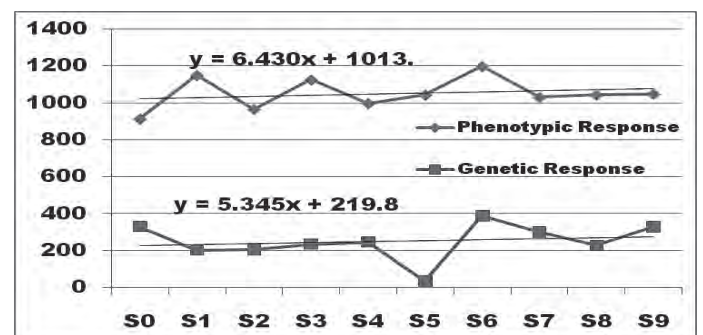


Fig. 5. Genetic and phenotypic response to 5 weeks body weight in PB-1

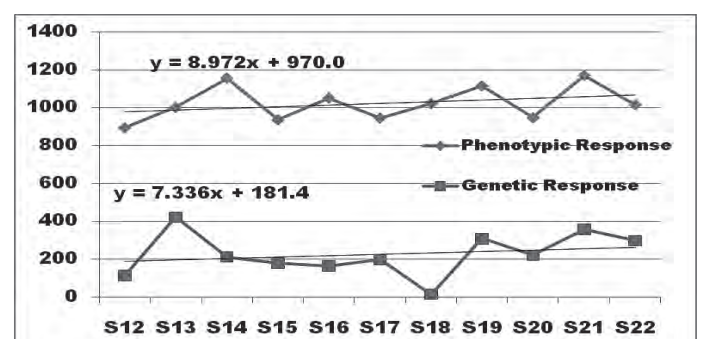


Fig. 6. Genetic and phenotypic response to 5 weeks body weight in PB-2

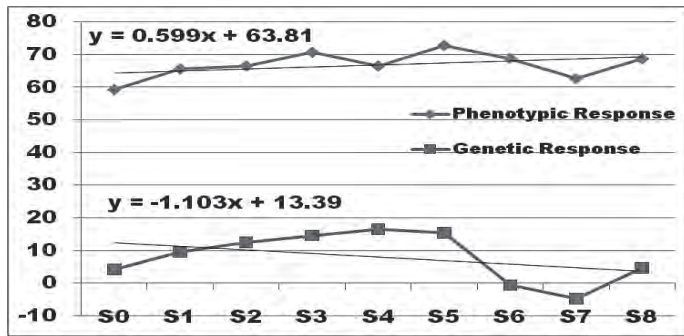


Fig. 7. Genetic and phenotypic response of Egg Production upto 40 wks in PB-1

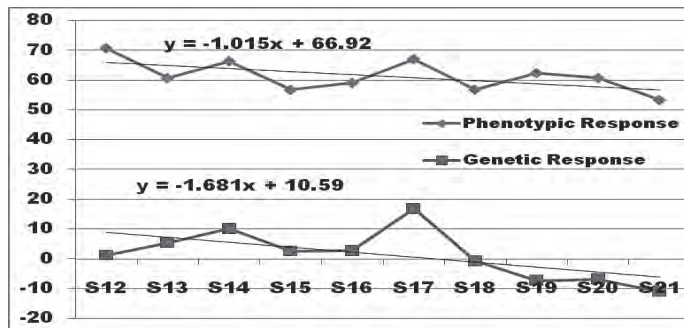


Fig. 8. Genetic and phenotypic response of Egg Production upto 40 wks in PB-2

Random sample poultry performance test

The center participated in the 46th RSPPT for broilers at Gurgaon, Haryana during 2016-17. The average body weights at 6 and 7 weeks of age were 1020 and 1640 g in Raja - II (PB-1 x PB-2). The feed efficiency was 2.14 between 0 - 6 weeks and 2.93 between 0 - 7 weeks.

Carcass and sensory evaluation of commercials at 6 weeks (PB-1 X PB-2)

The overall dressing percentage was 65.92. The thigh weight was 176 g and that of breast was 238 g. The drumstick weight was 155.80 g. The weights of heart, liver and gizzard were 7.10, 40.00 and 47.00 g, respectively. The average sensory ratings for meat of commercial broiler with respect to appearance, juiciness, tenderness and flavor were 6.30, 6.32, 6.02 and 6.22 in the scale of 0 to 10. The overall acceptability was 6.48.

Field evaluation of PB-1 X PB-2 Cross breeds

No. of chicks reared- 160

Average 6th week body weight : 1.48 kg
 Average 7th week body weight : 1.96 kg
 FCR : 2.09
 Survivability : 97.30%

Economics of rearing commercial Raja-II (PB-1 X PB-2) birds at field level

1. Expenditure

Cost of chick 160 X Rs. 15 = 2,400-00
 Cost of feed (approx) upto 6 weeks 160 birds X3kg feed X Rs.28 = 12,854.00
 Other expenditure 160 birds X Rs.10 = 1,600-00
 Total Expenditure = 16, 854-00

2. Income

150 birds X 1.5kg X Rs.90= Rs.20, 646.00
 Profit (approx) 20,646- 16, 854 = Rs 3,792.00

Economics of rearing commercial birds (PB-1 X PB-2) at farm

No. of chicks reared : 200
 Mortality : 3%
 Avg. 6th week body weight : 1609.00 gm
 FCR : 1.90

Expenditure

Cost of chicks @Rs.15/chick X 200 = 3,000-00
 Cost of feed(194x1.6x1.9xRs. 30) = 17,692-00
 Other expenditure @Rs.10/bird = 1,940-00
22,632-00

Receipt

194 X1.6 X Rs.90/kg = 27,936-00
 Profit = 27,936-22,632 = 5,304-00

Frequency distribution of 5 weeks body wt.

Frequency distribution for body weight at 5 weeks of age in both the selected and control line are presented in Fig. 10.

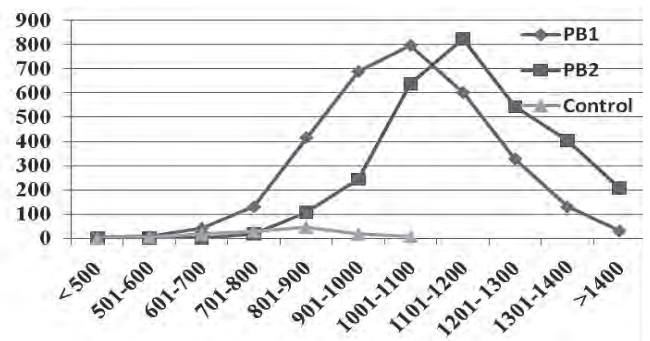


Fig. 10. Frequency distribution of 5th week body weight in PB-1, PB-2 and control lines

Germplasm supplied

A total of 1, 52,641 germplasms (1, 48,902 day old chicks and 3,739 hatching eggs) were supplied to farmers and other stakeholders during the current year.

Receipts

During the year 2016-17, the center generated revenue of Rs. 41.71 lakhs which is 116.49% of expenditure on feed cost (Rs. 35.81 lakhs).

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Programme activity assigned

- Evaluation of native chicken germplasm collected from farmers.
- To evaluate and improve the PB-2 and PB-1 populations as a broiler dam and sire lines.
- To evaluate a control population for evaluating the environmental fluctuations.

Action taken during the year 2016-17

- Center has initiated evaluation of native chicken germplasm.
- A total of 2266 good chicks of local native chicken were hatched.
- Different parameters viz; fertility percent, hatchability percent, juvenile traits, ASM, egg weights at 28 and 40 weeks, egg production upto 40 and 52 weeks and mortality percent at different time intervals were recorded in native chicken germplasm.
- The crossing of PB-2 X Local Native Chicken and reciprocal crosses were initiated.
- The centre regenerated S-9 generation of PB-1 and S-41 generation of PB-2 population.
- During the current year juvenile traits and production traits up to 52 weeks were evaluated.

Collection, conservation and evaluation of native germplasm

The evaluation of local native chicken germplasms was carried out. A total of 2640 fertile eggs were set for hatching. The percent fertility in native local chicken was 94.43%. The hatchability percent on TES and FES were 85.83 and 90.89, respectively. The body weight of chicks at day one, 4 and 8 week were 36.38 ± 0.07 , 352.07 ± 2.79 , 648.58 ± 4.56 g. The FCR was very high 4.3. The mortality percent in different age groups of 0-8, 9-20, 21-40 and 21-52 were 12.35, 2.90, 8.67 and 4.67, respectively. The performance of PB-2 (M) x DESI (F) and DESI (M) x PB-2 (F) (reciprocal) were also recorded. Among the dual cross varieties the PB-2 (M) x DESI (F) has better 40 weeks egg production performance. Comparison of mortality performance indicated that the PB-2 (M) x DESI (F) had lesser mortality percentage in comparison to DESI (M) x PB-2 (F). Both the dual cross varieties seemed to reach favorable market weight (i.e. ≥ 1100 grams) by 12 weeks of age.

Conservation and utilization of elite germplasm

Selection records

Summary of selection records over the last 2 generations for PB-1 and PB-2 are presented in Table 40. The intensity of selection improved in the

Table 40. Comparative performance of native local germplasm and its crosses with PB-2 line

Body weights	Local Germplasm (DESI)		PB-2 (M) x DESI (F)		DESI (M) x PB-2 (F) (Reciprocal)	
	N	Mean \pm SE	N	Mean \pm SE	N	Mean \pm SE
Day Old	2256	36.38 \pm 0.07	482	38.92 \pm 0.15	448	39.85 \pm 0.15
4week	2009	352.07 \pm 2.79	435	249.09 \pm 3.32	337	193.14 \pm 4.04
8week	1862	648.58 \pm 4.56	402	706.87 \pm 8.29	286	758.20 \pm 14.16
FCR (up to 8 weeks)	4.3		3.9		4.1	
12 week	912	1131.41 \pm 8.64	374	1211.60 \pm 12.46	268	1494.64 \pm 20.81
20 week	795	1646 \pm 11.78	315	1895.2 \pm 22.14	256	2171.23 \pm 29.15
40 week	415	2356.11 \pm 32.65	46	2555.86 \pm 65.66	42	2803.09 \pm 76.66
ASM	322	207.41 \pm 0.61	45	197.26 \pm 2.47	41	207.21 \pm 2.01
Egg Weight 28 week	120	44.66 \pm 0.30	--	--	--	--
Egg Weight 40 week	309	49.74 \pm 0.20	--	--	--	--
Egg Production 40 week	322	57.49 \pm 0.81	45	55.37 \pm 2.10	41	48.90 \pm 2.57
Egg Production 52 week	321	90.98 \pm 1.37	--	--	--	--

current generation in PB-2 as compared to previous generation. The effective selection differential increased in PB-1 but decreased in PB-2 as compared to previous generation (Table 41).

Table 41. Summary of selection records in last two generations in PB-2

Parameters	PB-1		PB-2	
	S-8	S-9	S-40	S-41
Sires used	73	62	105	80
Dams used	504	372	480	480
Sires contributed	72	62	80	80
Dams contributed	456	349	480	480
Effective number	248.73	252	270.48	274.1
Rate of inbreeding	0.004	0.002	0.0036	0.002
Average Expected selection differential	124.84	209.43	124.84	117.93
Average effective selection differential	211.55	-	120.64	-
Selection intensity (σ) M	0.04	3.14	0.04	3.17
	F	0.03	2.96	0.03
Expected response	29.70	52.36	17.47	29.48

Incubation records

During the current generation a total of 3699, 4322 and 434 good chicks were hatched in PB-1, PB-2 and Control populations, respectively (Table 42). The percent fertility was 73.3 and 95.2% in PB-1 and PB-2 lines. The hatchability on total eggs set was 65, 89.4 and 72.3% in PB-1, PB-2 and Control lines, respectively. The fertility percent and hatchability on TES decreased in PB-1 and these values increased in PB-2 and Control lines as compared to last generation.

Table 42. Incubation records for PB-1, PB-2, Control line

Generations	Eggs set (No.)	Fertility (%)	Good chicks (No.)	Hatchability (%)	
				TES	FES
PB-1					
S-8	6100	92.6	4880	80	86.4
S-9	5981	73.3	3699	65	88.6
PB-2					
S-40	5806	94.6	5094	87.7	92.8
S-41	4954	95.2	4332	89.4	93.9
Control					
2015-16	600	64.8	300	50	77.1
2016-17	600	98.2	434	72.3	73.7

Mortality

During 0-5 week, the mortality percent reported in PB-1, PB-2 and Control lines were 18.58, 11.88 and 23.09%, respectively (Table 43). During grower period mortality of 11.3, 8.67% and 12.98 was recorded in PB-

1, PB-2 and Control, respectively. Mortality percent although decreased across all age groups still it was very high in 0-5 weeks in PB-1 and Control lines as compared to last year. Centre needs extra attention on health management of the flock.

Table 43. Mortality percentage at different ages in PB-1, PB-2 and Control

Generations	Mortality (%)		
	0-5 wks	6-20 wks	21-52 wks
PB-1			
S-8	12.95	21.15	10.94
S-9	18.58	11.33	11.87
PB-2			
S-40	20.36	9.8	9.16
S-41	11.88	8.67	8.59
Control			
2015-16	16.33	9.5	20.78
2016-17	23.09	12.98	14.77

Body weight

During current generation the average body weight at 5 weeks of age was 1157.57±4.3, 1061.62±3.54 and 946.87±19.35 g in PB-1, PB-2 and Control lines, respectively (Table 44). The feed efficiency up to 5 weeks of age improved in PB-1, PB-2 lines over last generation. The body weight at 5 weeks of age increased in PB-1 and PB-2 lines as compared to previous generation.

Table 44. Body weight and feed efficiency at 5 weeks during last two generations

Generations	5wk (g)	Feed Efficiency (upto 5 wks)
PB-1		
S-8	1089±3.7(3285)	2.1
S-9	1157.57±4.3(2118)	2.0
PB-2		
S-40	929.42±2.84 (4005)	2.2
S-41	1061.62±3.54 (1960)	2.1
Control		
2015-16	784.72±11.07(220)	1.9
2016-17	946.87±19.35 (195)	1.9

Body weight of cross

Body weight of IBL80 birds at 6 and 7 weeks of age was 1003±14.50 and 1210±15.63 g, respectively. There was increase in body weight of cross at 6 and 7th week of age as compared to last year (Table 45).

Table 45. Average body weights of a sample of IBL80 birds at 6 and 7 weeks of age

Age	Mean± SE (2015-16)	Mean± SE (2016-17)
6 weeks (g)	905±13.90 (230)	1003±14.50 (31)
7weeks (g)	1131.88±11.33(225)	1210±15.63 (31)

Production traits

The production traits were recorded up to 52 weeks of age (Table 46, 47 and 48). The body weight of PB-1, PB-2 and Control lines at 20 weeks of age were 2510.19 ± 11.45, 2298.36 ±7.92 and 2127.38±36.68 g, respectively. There was decrease in body weight of PB-1 at 20 weeks of age still it is beyond optimum recommended level for female. Center needs to implement feed restriction program in a better way in maintaining the required body weight. In PB-2 the body weight at 20 weeks was as per the recommended level.

Table 46. Adult body weight in PB-2, PB-1 and control lines

Generations/year	Body weight (g)	
	20 wks	40 wks
	PB-1	
S-8	2659.83±11.82(924)	2817±12.6(502)
S-9	2510.19 ± 11.45 (1137)	2818 .36 ±11.66 (885)
	PB-2	
S-40	2327.07±9.05(1129)	2848.75±13.4(480)
S-41	2298.36 ±7.92 (1127)	2603.18±9.36 (979)
	Control	
2015-16	2285.27±26.15(102)	3144.20±24.85(77)
2016-17	2127.38±36.68 (88)	3287.67 ±46.24 (56)

The age at sexual maturity increased in PB-1, PB-2 and Control lines as compared to previous generation. The egg weight at 36 weeks of age in all lines decreased in three lines as compared to previous generation. Egg weight at 52 weeks increased in PB-1and decreased in PB-2 line .There was appreciable increase in the egg production up to 52 weeks of age in all the lines as compared to last generation.

Table 47. ASM and egg weight performance

Generations	ASM (d)	Egg weight (g)	
		36 wks	52 wks
		PB-1	

S-8	174±0.67 (878)	58.61±0.20 (426)	62.9±0.51 (116)
S-9	181.34±0.41 (1013)	51.50±0.15 (835)	63.77±0.35 (209)
	PB-2		
S-40	161.57±0.39 (1107)	60.45±0.18 (376)	62.18±0.21 (384)
S-41	163.45±1.08 (340)	47.61±0.37 (128)	53.54±0.20 (76)
	Control		
2015-16	183.83±2.87 (71)	53.10±0.50 (61)	61.28±0.68 (37)
2016-17	201.50±3.83 (74)	49.04±0.50 (57)	-

Table 48. Egg production performance

Strain	Egg production (No.)	
	40 wks	52 wks
	PB-1	
S-8	59.42±0.67 (504)	75.08±1.02 (504)
S-9	48.48±0.61 (1033)	100.10±1.18 (372)
	PB-2	
S-40	83.9±0.79 (480)	112.2±1.18 (439)
S-41	75.98±1.10(335)	116.50 ±1.75 (303)
	Control	
2015-16	49.21±2.42 (77)	83.42 ±3.45 (77)
2016-17	38.12±1.19 (74)	-

Egg quality traits

The egg quality traits measured at 36 weeks of age in PB-2 and control lines were presented in Table 49. The egg quality traits need to be measured at 32 weeks of age instead of 36 weeks.

Table 49. Mean and SE for egg quality traits at 36 weeks of age

Egg quality traits	Strains	
	PB-1	PB-2
	Mean ± SE	Mean ± SE
Egg weight (g)at 36 weeks	52.5±0.85	52.6±0.56
Shape Index (n=30)	74.3±1.02	75.5±0.52
Albumen height (mm)	8.69±0.22	8.72±0.26
Yolk height (mm)	17.0±0.14	16.5±0.07
Shell thickness(mm)	40.49±0.50	36.0±0.72
Haugh unit	123.65	122.36

Genetic parameters

The heritability estimates for 5 week body weight remained static in PB-2 in the present generation as compared to previous generation (Table 50). Similar trend was also observed for egg production up to

40 weeks of age. Heritability of egg weight at 36 weeks also remained static as compared to previous generation.

Table 50. Heritability estimates for various traits in PB-2

Traits	Heritability (2015-16)	Heritability (2016-17)
BW 5 wks	0.14±0.04	0.13±0.04
BW 20 wks	0.12±0.03	0.11±0.05
ASM	0.08±0.03	0.08±0.02
EW-36	0.06±0.04	0.07±0.03
EP40	0.13±0.06	0.13±0.07
EP52	0.08±0.05	0.09±0.05

Genetic and phenotypic response

The phenotypic and genetic response over last 10 generations at 5 week body weight was 3.68 and 24 g in PB-2 population (Table 51). The phenotypic responses of egg production up to 40 weeks of age was -0.72 egg and genetic response was 2.43 egg over 10 generations. The phenotypic and genetic response over last 9 generations at 5 week body weight was 10.07 and 24.50 g in PB-1. The phenotypic responses of egg production up to 40 weeks of age was -2.31 egg and genetic response was 1.44 egg over 9 generations (Fig. 11-14).

Table 51. Genetic and phenotypic response to 5th week body weight and 40th week egg production in PB-1 and PB-2 lines

Trait	PB-1		PB-2	
	Phenotypic response	Genetic response	Phenotypic response	Genetic response
BW 5 wks (g)	10.07	24.50	3.68	24
EP40 (eggs)	-2.31	1.44	-0.72	2.43

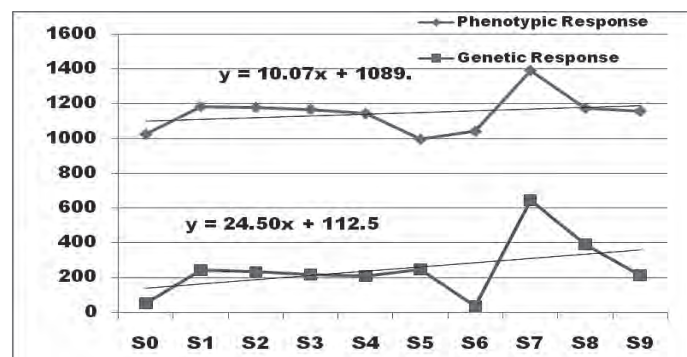


Fig. 11. Genetic and phenotypic response to 5 week body weight in PB-1 at Ludhiana

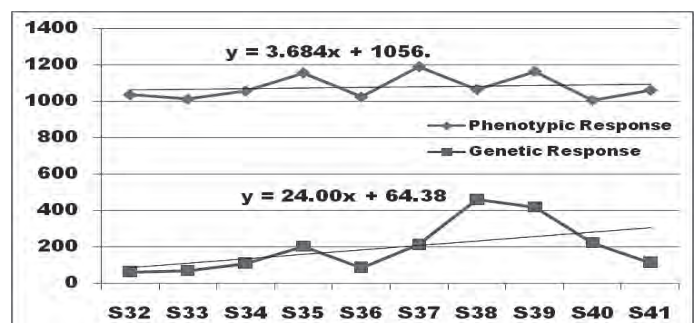


Fig. 12. Genetic and phenotypic response to 5 week body weight in PB-2 at Ludhiana

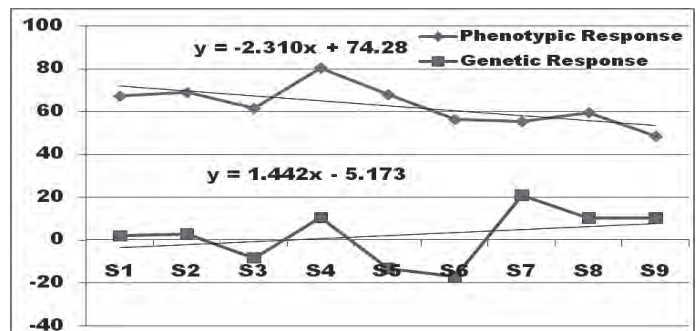


Fig. 13. Genetic and phenotypic response to EP40 in PB-1 at Ludhiana

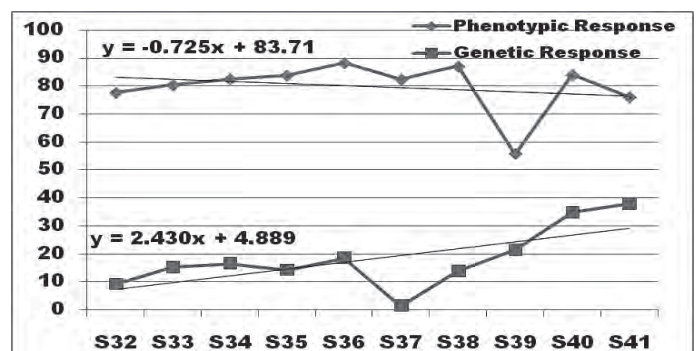


Fig. 14. Genetic and phenotypic response to EP40 in PB-2 at Ludhiana

Frequency distribution of 5 wks body weight

Frequency distribution of 5 wks body weight (frequency on Y axis and body weight on X axis) (Fig. 15). In PB-1 the body at 5 weeks ranged from 100 to 1800 g. Similarly in PB-2 range was from 200 to 1500g.

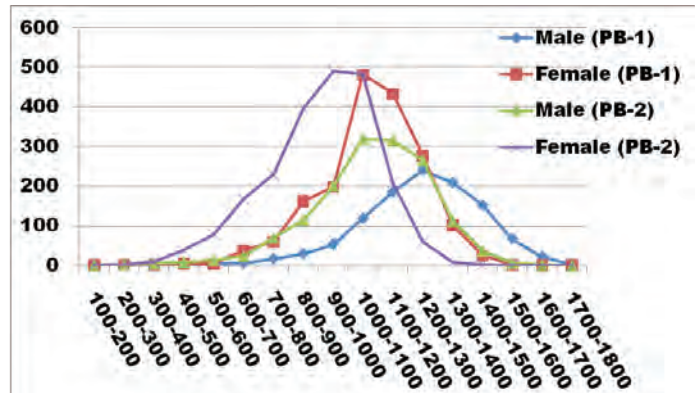


Fig. 15. Frequency distribution of 5-week body weight in PB-1 and PB-2 Male and female

Field evaluation

Table 52. Economic evaluation in the field (500 IBL-80 birds were supplied and 430 birds survived till 5 weeks of age)

Age	Body weight (g) per bird	Total feed consumed (kg)	Cost of feed @ Rs. 24.00/kg	Receipt when sold @ Rs. 70/kg live wt.* (Rs.)	Profit/loss per bird (Rs.)*
5 wks	1120	2.12	53	84	31

*Subject to market rates

Germplasm supplied

Centre supplied 57,950 germplasm to the farmers (Parents Stock=1500, Day Old Chicks=54,183, Young Broiler=2,267).

Receipts

During the year 2016-17, the center generated a revenue of Rs. 15.66 lakhs which is 94.32% of expenditure on feed (Rs. 16.60 lakhs).

Central Avian Research Institute

Izatnagar

Programme activity assigned

- Evaluation of local native chicken germplasm
- To improve and evaluate CSML and CSFL for development of broiler sire and dam lines, respectively.
- To maintain a control population simultaneously to measure the environmental trends.

Action taken during the year 2016-17

- Eggs procured from villages were hatched and were reared till adult stage and filtered for phenotypic characters.
- The body weights at different age and confirmatory parameters were recorded.
- During the year 2016-17 the centre evaluated CSML and CSFL populations.
- The juvenile traits and production traits up to 52 weeks were recorded.
- A random bred control line was also evaluated to measure environmental fluctuations.

Details of the implementation of programme and results achieved

Eggs procured from villages were hatched and reared till adult stage and filtered for phenotypic characters. Native chicken with colored plumage and similar phenotypic characters were retained. Juvenile traits of S-15 generation and production traits of S-14 generation in CSFL and CSML were recorded. A total of 3815 and 4208 good chicks of CSML and CSFL were produced. The fertility percentage was 85.56 and hatchability percentage on TES and FES were 77.26 and 90.30%, respectively in CSML. The average 5 weeks body weight up to first hatch was 1222.63±4.65 g. The average body weight at 5 week up to first hatch was 1222.63±4.65 g. A random bred control was also developed for estimation of environmental deviations. In Control line, a total of 946 eggs were set out of which 696 good chicks were hatched in two hatches with percent fertility of 84.29% and hatchability of 74.72 (TES) and 87.26% (FES).

Collection, conservation and evaluation of native germplasm

Eggs procured from villages were hatched and reared till adult stage and filtered for phenotypic

characters. A total of 542 good chicks with fertility and hatchability (TES) of 94.26% and 89.47%, respectively were produced. The body weight of local native chicken germplasm at 4, 8, 12 and 20 week were 185.71±3.13, 510.44±10.87, 1307.50±137.9 and 1483.56±272.06g, respectively. Shank length at 4, 8, 12 and 20 week were 3.61±0.02, 5.34±0.05, 8.43±0.38 and 8.27±0.27 cm, respectively.

Conservation and utilization of elite germplasm

Selection records

Over last two generations the selection records for CSML and CSFL are summarized in Table 53. The present generation was reproduced utilizing 55 sires and 330 dams in CSML and 60 sires and 360 dams in CSFL. The effective number increased in both CSML and CSFL. The average effective selection differential decreased over the last generation in CSML and CSFL. The intensity of selection increased in CSML as well as CSFL as compared to previous generation. The number of dam used is less as per the technical programme in both the lines.

Table 53. Summary of selection records for two generations in CSML and CSFL

Particulars	CSML		CSFL	
	(S-14)	(S-15)	(S-14)	(S-15)
Sires used	50	55	56	60
Dams used	300	330	336	360
Sires contributed	46	50	52	56
Dams contributed	276	300	312	336
Effective number	157.71	171.43	178.28	192.00
Rate of inbreeding	0.0021	0.0029	0.0019	0.0026
Average selection differential	194.99	170.06	178.78	148.66
Average effective selection differential	177.44	296.63	157.32	276.23
Selection intensity (σ)	0.903	1.81	0.893	1.39

Incubation records

The incubation records for the CSML, CSFL and the control lines over last two generations are presented in Table 54. The percent fertility remained above 85 percent in both the selected populations. The hatchability decreased in CSML and CSFL

populations as compared to previous generation.

Table 54. Summary of incubation and hatching results during last two generations

Generation	Eggs set	Fertility (%)	Good Chicks	Hatchability%	
				TES	FES
CSML					
S-14	1087	88.22	-	81.87	92.80
S-15	5000	85.56	3815	77.26	90.30
CSFL					
S-14	1308	91.67	-	85.09	92.82
S-15	5287	88.99	4208	80.99	91.01
Control					
S-14	940	86.48	-	75.95	87.82
S-15	946	84.92	696	74.72	87.26

Mortality

The percent mortality up to 5 weeks of age decreased in the current year as compared to previous one and is well within recommended limits across three lines (Table 55). Although mortality has decreased in current year in CSML and CSFL as compared to previous generation still center need to control mortality in CSML and CSFL during 6-20 week age group to to maintain within recommended level.

Table 55. Mortality records for last two years

Generation	0-5 wks (%)	6-20 wks (%)
CSML		
S-13	5.04	19.29
S-14	4.87	10.40
CSFL		
S-13	5.02	17.88
S-14	4.30	9.56
Control		
S-13	4.56	4.21
S-14	1.57	1.47

Body weights

The body weight at 5 weeks of age and FCR for CSML, CSFL and control lines over last two generations are

Table 56. Body weight and FCR at 5 weeks during the last two generations

presented in Table 56. The body weight at 5 weeks of age in CSML, CSFL and Control lines recorded in the S-15 generation were 1222.63±4.65, 1209.32±1.95 and 756.67±7.45 g, respectively. The body body weight at 5 week increased in CSML and CSFL as compared to previous generation. The FCR at 5 week of age in CSML, CSFL and control was 2.12, 2.02 and 2.25, respectively.

Table 56. Body weight and FCR at 5 weeks during the last two generations

Generation	5 weeks	
	Body weight (g)	FCR
CSML		
S-14	1210.81±4.84 (3250)	2.1
S-15	1222.63±4.65 (650)	2.12
CSFL		
S-14	1196.32±1.95 (3000)	2.15
S-15	1209.32±1.95 (650)	2.02
Control		
S-14	NR	2.24
S-15	756.67±7.45 (310)	2.25

Production traits

The body weight at 20 weeks was optimum indicating the effectiveness of restricted feeding. The average ASM of CSML and CSFL decreased in the current generation as compared to last generation (Table 57). Egg weight at 40 weeks was decreased in CSML but increased in CSFL as compared to previous generation. The 40 week egg production increased in CSML and CSFL as compared to previous generation (Table 58).

Table 57. Adult body weight and ASM of females in last two generations

Gen	20 week body weight(g)			ASM(days)		
	CSML	CSFL	Control	CSML	CSFL	Control
S-13	2451.62±19.07	2346.68±13.62	2315.68±14.42	182.53	179.30	NR
S-14	2470.12±19.07	2355.12±12.31	2308.31±11.02	177.25	176.57	175.45

Table 58. Production performance of females in last two generations

Generation	EW 40 wks (g)			EP up to 40 wks			EP up to 52 wks		
	CSML	CSFL	Control	CSML	CSFL	Control	CSML	CSFL	Control
S-13	65.24	66.96	-	65.4	65.8	55.03	105.44	106.74	54.23
S-14	62.14	67.07	-	66.5	66.68	54.23	105.5	106.8	NR

Egg quality traits

Egg quality traits were measured in CSML and CSFL at 32, 40 and 52 weeks of age (Table 59 and Table 60). Most of the egg quality traits shown improvement in CSML and CSFL as compared to last generation.

Table 59. Egg quality traits at 32 40 and 52 weeks CSML during 2016-2017 (S-14)

Traits	32 weeks	40 weeks	52 week
Egg weight (g)	56.54±0.52	62.14±0.76	65.40±1.52
Egg length (mm)	55.94±0.24	59.95±0.29	59.57±0.34
Shape index	76.53±0.34	75.51±0.57	76.28±0.34
Albumen height (mm)	9.76±0.24	8.30±0.16	9.76±0.18
Yolk height (mm)	19.88±0.2	21.38±0.44	21.16±0.20
Yolk index	0.50±0.01	0.48±0.01	0.50±0.01
Egg shell thickness (mm)	0.39±0.01	0.38±0.01	0.38±0.01
Haugh unit	98.26±1.16	89.42 ±1.16	97.39 ±0.82

Table 60. Egg quality traits at 32 , 40 and 52 in CSFL during 2016-2017 (S-14)

Traits	32 weeks	40 weeks	52 week
Egg weight (g)	56.19±1.86	67.07±0.91	63.98±0.84
Egg length (mm)	56.70±1.81	59.91±0.39	58.89±0.39
Shape index	74.64±1.76	74.60±0.52	76.41±0.76
Albumen height (mm)	9.76±0.33	8.49±0.15	9.63±0.18
Yolk height (mm)	19.60±0.19	22.75±0.13	20.83±0.18
Yolk index	0.50±0.01	0.51±0.01	0.49±0.01
Egg shell thickness (mm)	0.38±0.01	0.37±0.01	0.38±0.01
Haugh unit	97.25±2.53	90.04±0.77	96.41 ±0.83

Heritability

Heritability estimates from sire component for body weight at 5 week was 0.12± 0.09, 0.11 ± 0.05 and 0.15± 0.08 in CSML, CSFL and control populations, respectively (Table 61).

Table 61. Heritability estimates for 5 week body weight

Generations	Heritability		
	CSML	CSFL	Control
S-14	0.12±0.09	0.11±0.05	0.15±0.08

Response

Genetic response over last 10 generations of CSML and CSFL is presented in Fig. 16-17. The phenotypic

response per generation was 15.96 and 15.85 g in CSML and CSFL, respectively. The genetic response was 14.34 and 14.19 g, respectively, in CSML and CSFL lines in last 10 generations (Table 62).

Table 62. Phenotypic and genetic response at 5 week body weight (g).

Trait	Phenotypic Response	Genetic Response
CSML (S-14)	15.76	10.18
CSML (S-15)	15.96	14.34
CSFL (S-14)	15.82	10.17
CSFL (S-15)	15.85	14.19

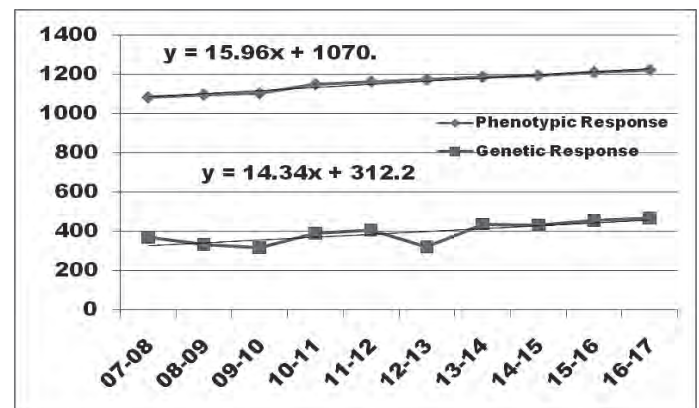


Fig. 16. Genetic and phenotypic response to 5 wks body weight in CSML at Izatnagar

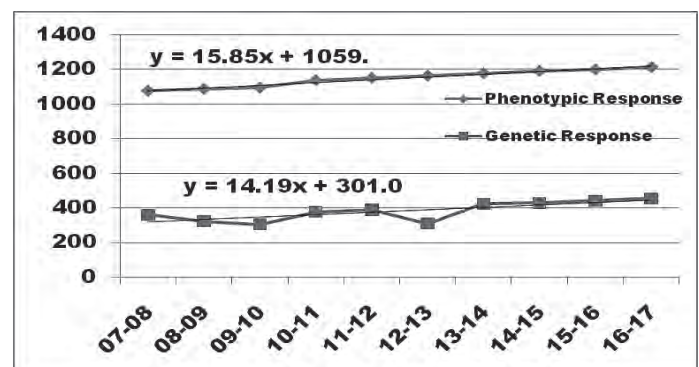


Fig. 17. Genetic and phenotypic response to 5 wks body weight in CSFL at Izatnagar

Random sample poultry performance test

Center participated 46th RSPPT at Gurgaon result is awaited.

Frequency distribution

As data recording of body weight at 5 week is going therefore Frequency distribution of CSML and CSFL not included.

Germplasm supply

A total 44,473 germplasm was supplied to the farmers and other stakeholders during the current year.

Odisha University of Agriculture and Technology

Bhubaneswar

Programme activity assigned

- Evaluation of local native chicken germplasm.
- To improve and evaluate CSFL and CSML populations in respects of broiler traits.
- To evaluate the control population along with CSFL and CSML populations.

Action taken during the year 2016-17

- Center has initiated evaluation of the native chicken collected from the field.
- A total of 1442 Hansli chicks were produced.
- Data recording of S-1 generation of native chicken was initiated.
- During the period S-5 generation of CSFL and CSML were raised and evaluated for juvenile traits.
- During current generation S-5, a total of 3448, 3159 and 300 good chicks of CSFL, CSML and Control lines were hatched.
- During the current year S-4 generation of CSFL and CSML lines were evaluated for production traits.

Details of the implementation of the programme and results achieved

During the current year, centre completed the purification of local indigenous chicken. Performance evaluation of local indigenous chicken germplasm was initiated. The body weight of indigenous germplasm at day old and 8 weeks was recorded. During the current year, production traits of CSFL, CSML and Control lines were evaluated for S-4 generation. The S-5 generations of CSFL and CSML along with control lines were regenerated and evaluated for juvenile traits.

Collection, conservation and evaluation of native germplasm

A total of 1442 good chicks of S-1 generation of local native chicken germplasm was hatched. The fertility percent was 81.52% which was more than that of the previous generation (77%). The hatchability

percent on TES and FES basis were 67.84 and 83.15%, respectively. Which have shown improvement as compared to previous generation. The mortality percent in S-0 generation at 0-8, 9-20 and 21-40 weeks were 4.30, 2.06 and 4.75%, respectively. The mortality percent in 0-8 week age group of S-1 is 4.89% which is well within the prescribed level. The average body weight at day one and 8week was 30.45 ± 0.05 (1389) and 552.10 ± 12.21 (1317)g. The FCR was 4.26. The egg production up to 40 week in S-0 generation was 14.27. The egg weight at 32 and 40 week was 39.34 ± 0.36 (174) and 43.20 ± 0.55 (174).

Conservation and utilization of elite germplasm

Selection records

A total of 46 sires and 364 dams were used in CSFL whereas number of sires and dams used in CSML were 47 and 376, respectively, to reproduce the S-5 generation. The average selection differential decreased in CSFL but increased in case of CSML as compared to previous generation. Selection intensity decreased in CSFL female but increased in female CSML in the current generation as compared to previous generation. The details of the summary of the selection records is presented in Table 63.

Incubation records

The overall fertility in CSFL and CSML was 90.15, 90.54 and 79.21%, it has increased in all the lines as compared to previous generation. The hatchability on total and fertile egg set basis in the current generation was more than the previous generation in CSFL and CSML. The summary of incubation records is presented in Table 64.

Table 64. Incubation records for CSFL, CSML and control line

Generation	Eggs set	Fertility (%)	Good chicks	Hatchability (%)	
				TES	FES
CSFL					
S-4	4318	89.89	3000	71.46	79.49

Table 63. Summary of selection records of CSFL and CSML S- 3 generation

Sl. No.	Particulars	CSFL		CSML	
		S-4	S-5	S-4	S-5
	Generation				
1	Sires used	52	46	48	47
2	Dams used	416	364	384	376
3	Sires contributed	48	46	46	45
4	Dams contributed	402	360	376	368
5	Effective number	171.52	163.15	163.94	160.38
6	Rate of inbreeding	0.003	0.003	0.003	0.003
7	Expected selection differential for males	187.16	184.14	155.21	165.51
8	Expected selection differential for females	101.33	110.33	112.18	80.93
9	Average expected selection differential	144.24	147.23	133.695	123.22
10	Effective selection differential for males	153.27	143.16	132.08	142.35
11	Effective selection differential for females	121.89	112.67	118.46	121.78
12	Average effective selection differential	137.58	127.91	125.27	132.07
13	Selection intensity	M	1.15	1.06	1.13
		F	0.92	0.95	0.99

S-5	4272	90.15	3448	82.15	91.13
CSML					
S-4	5011	89.86	3497	69.95	77.90
S-5	4473	90.54	3159	82.98	91.63
Control					
S-4	620	68.06	360	59.35	87.20
S-5	630	79.21	300	50.95	64.32

S-5	4.91	NC	NC
CSML			
S-4	4.89	4.89	4.30
S-5	5.06		
Control			
S-4	5.83	0.00	6.00
S-5	6.33	NC	NC

NC is not completed, NR is not reported

Mortality

The mortality percent during 0-5 weeks in CSFL, CSML and control line was 4.91, 5.06 and 6.33, respectively. The mortality was well within recommended level in the current generation (Table 65).

Table 65. Mortality (%) at different ages

Generation	Age in weeks		
	0-5	6-20	21-40
CSFL			
S-4	5.20	4.05	4.81

Body weight

The body weight at 5 weeks of age in CSFL, CSML and Control lines were 1009.77±4.29, 1112.36±6.18, 769.72±14.88 g, respectively. In the current year the body weight at 5 weeks remained static in CSFL and CSML. FCR up to 5 weeks of age decreased across three lines in the current generation as compared to previous generation. The juvenile traits during current and previous generations are presented in Table 66.

Table 66. Body weight, FCR and conformation traits in CSFL, CSML and control

Bhubaneswar	BW 5 wks (g)	FCR	BA (degree)	SL (cm)	KL (cm)
CSFL					
S-4	1000.9±3.14 (2844)	1.97	52.04±0.98 (2844)	8.09±0.06 (2844)	9.03±0.07 (2844)
S-5	1009.77±4.29 (2457)	1.93	52.16±1.01 (2457)	8.14±0.05 (2457)	9.16±0.05 (2457)
CSML					
S-4	1102.18±3.69 (3326)	1.93	51.81±0.34 (3326)	8.26±0.08 (3326)	9.20±0.05 (3326)
S-5	1112.36±6.18 (2700)	1.90	51.31±0.35 (2700)	8.18±0.09 (2700)	9.18±0.06 (2700)
Control					
S-4	787.03±12.21 (339)	1.98	48.97±0.90 (339)	8.03±0.06 (339)	9.12±0.08 (339)
S-5	769.72±14.88 (271)	1.91	47.97±0.91 (271)	7.92±0.05 (271)	8.99±0.07 (271)

Production traits

Twenty week and 40 week body weights in CSFL and CSML are presented in Table 67. The body weight at 20 week of age in CSFL and CSML are well within recommended limit. Restricted feeding regime was effective in controlling the adult body weights. ASM of current generation (S-4) in CSFL and CSML was lesser as compared to previous generation (S-3).

Table 67. Body weight at 20 and 40 week in CSFL, CSML and Control

Genera-tion	ASM (d)	20 wks body weight (g)	40 wks body weight (g)
CSFL			
S-3	184	2099.89±17.61	2725.14±52.71
S-4	182	2302.37±14.67 (300)	3048.78±64.48 (300)
CSML			
S-3	189	2063.83±21.56	2558.88±30.99
S-4	184	2479.91±21.11 (300)	3227.65±30.29 (300)
Control			
2015-16	174	2125.39±15.25 (100)	3142.01±17.89 (100)

Egg weights and egg production traits

Egg weights at 32 week in CSFL and CSML has remained static in the current year as compared to previous year. Whereas, the egg weight at 40 week decreased in CSFL and remained static in CSML. Egg production up to 40 in CSFL and CSML were 64.32 and 61.39. EP40 has decreased in both the lines. Egg production up to 52 week increased appreciably in CSFL as well as CSML. Egg weight and egg production in CSFL and CSML lines are presented in Table 68.

Table 68. Egg weight and egg production in CSFL and CSML lines

Genera-tion	EW 32 wks (g)	EW 40 wks (g)	EP up to 40 wks (No.)	EP up to 52 wks (No.)
CSFL				
S-3	52.07	59.69	65.41	107.83
S-4	52.54±0.34	56.98±0.79	64.32	109.17
CSML				
S-3	53.78	55.41	62.38	101.14
S-4	52.96±0.32	55.22±0.47	61.39	107.23

The egg quality

The egg quality of CSFL and CSML are presented in Table 69.

Table 69. Mean±SE for egg quality traits of CSFL and CSML for S-3 and S-4 generations

Egg quality traits	Strain (CSFL)		Strain (CSML)	
	S-3	S-4	S-3	S4
EW (g)	52.07	52.54	53.78	52.96
	±0.36	±0.34	±0.34	±0.32
	32 wks			
40 wks	57.62	56.98	55.41	55.22
	±0.83	±0.79	±0.47	±0.47
52 wks	59.69	59.21	58.39	58.11
	±0.85	±0.85	±0.55	±0.54
Shape index	75.92	74.33	72.54	71.31
	±0.45	±0.41	±0.45	±0.49
52 wks				
Shell thickness	0.378	0.377	0.416	0.422
	±0.04	±0.04	±0.04	±0.04
mm				
Albumin index	0.084	0.082	0.071	0.073
	±0.005	±0.005	±0.006	±0.006
Yolk index	0.446	0.471	0.484	0.495
	±0.004	±0.004	±0.002	±0.002
Haugh unit	77.15	76.29	80.18	81.29
	±2.13	±2.24	±1.59	±1.63

Response to selection

The phenotypic response of CSML and CSFL over four generations were 111.8 and 68.35 g, respectively (Table 70). The genetic response in respective lines were 94.64 and 51.18 (Fig. 18-19).

Table 70. Phenotypic and Genetic response to body weight at 5 wks (g)

Trait	Phenotypic	Genetic
CSML	111.8	94.64
CSFL	68.35	51.18

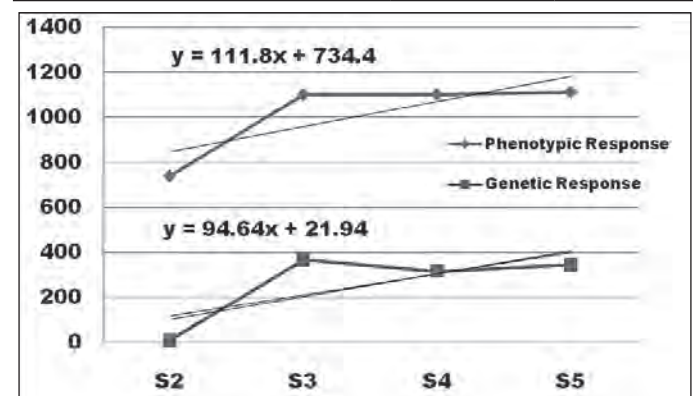


Fig. 18. Genetic and Phenotypic response to 5 wk body weight in CSML at Bhubaneswar

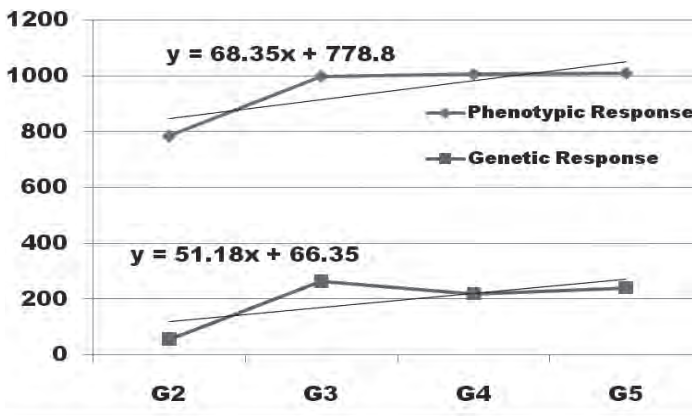


Fig. 19. Genetic and phenotypic response to 5 wks body weight in CSFL at Bhubaneswar

Frequency distribution of 5 weeks body weight of CSML and CSFL

The body weight of CSFL and CSML at 5th week ranged from 700 to 1500g. Frequency distribution of 5th week body weight of CSML and CSFL is given in Fig. 20.

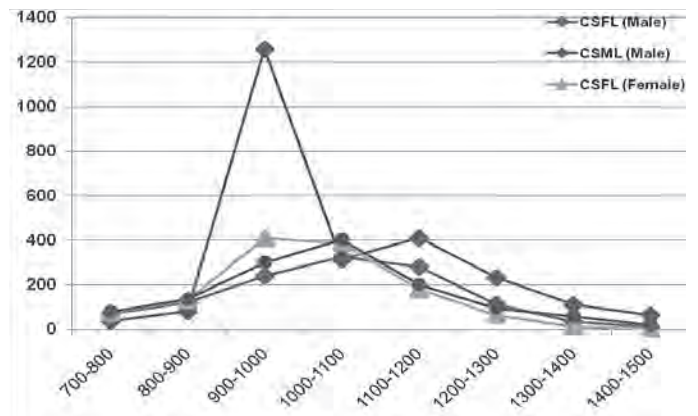


Fig. 20. Frequency distribution of 5 weeks body weight of CSML and CSFL (Male and Female)

Supply of germplasm

This center supplied a total of 51,783 germplasm to the farmers.

Receipts

During the year 2016-17, the center generated revenue of Rs. 14.00 lakhs which is 72.87% of expenditure on feed (Rs.19.21 lakhs).

ICAR Research Complex for NEH Region Agartala

Programme activity assigned

- Collection and evaluation of the local native chicken.
- Procurement and evaluation of improved chicken germplasm in the local climatic conditions.
- Production and evaluation of crosses of local native birds with improved germplasm.
- Development of germplasm for rural poultry for the region utilizing local native population.

Action taken

- During the present year, the centre evaluated Tripura black, *Dahlem Red*, broiler dam line and broiler dam line up to 20 weeks of age.
- Three way cross was evaluated from 52-72 weeks during E-1 and up to 20 weeks of age in E-2.

Details of the implementation of programme and results achieved

During the period under report, the centre hatched 1044 good chicks of Tripura black and evaluated up to 20 weeks of age. The *Dahlem Red* was also evaluated up to 20 weeks of age using 1072 chicks. Three way cross was also evaluated from 52-72 weeks during E-1 and E-2 was evaluated up to 20 weeks of age.

Incubation records

The percent fertility ranged from 54.41 to 85.87% (Table 71). The fertility improved in all the populations as compared to previous generation except in BN and BND crosses. The hatchability on total eggs set (45.95

to 64.97%) and hatchability on fertile egg set (68.58 to 84.46%) improved in all the lines. Centre need to hatch more number of chicks in native population as per technical program.

Mortality

The percentage of mortality during brooding period was high in Tripura black (10.99%) and *Dahlem Red* populations (10.00%). During growing period the mortality was very high and ranged from 10.52 – 13.20% and during laying period it ranged from 2.53 – 9.25% (Table 72). Centre has to take all the precautions to control mortality with strict bio-security measures.

Table 72. Mortality percent at different ages

Strain	Year	0-5 wk	6-20 wk	20-40 wk	41-72 wk
Tripura black	2015-16	9.16	10.52	9.17	3.52
	2016-17	10.99	7.52	2.53	2.27
DR	2015-16	9.75	8.73	9.23	8.81
	2016-17	10.00	11.71	3.34	2.47
BN cross	2015-16	1.61	4.34	-	28.50
	2016-17	3.72	9.88	2.89	-
ND cross	2015-16	5.11	8.10	-	6.97
	2016-17	4.30	13.20	1.48	1.20
BNxD cross	2015-16	3.93	4.41	8.41	6.06
	201-17	7.00	13.18	9.25	6.76

Performance of pure lines and crosses

The body weight at 8 weeks was 316.44, 544.24, 1044.80 and 550.18 g in Tripura Black, *Dahlem Red*, coloured broiler dam line and BN cross, respectively (Table 73). . During E-1 evaluation the 72 week egg

Table 71. Summary of incubation and hatching of different populations

Strains	Year	Eggs set	Fertility (%)	Hatchability (%)		Good chicks hatched (No.)
				TES	FES	
Tripura Black	2015-16	2483	72.65	47.88	65.90	1189
	2016-17	1688	80.50	61.84	76.82	1044
CSFL	2015-16	5593	82.69	61.54	74.42	3442
	2016-17	177	85.87	64.97	75.60	115
<i>Dahlem Red</i>	2015-16	1377	70.44	38.70	54.94	533
	2016-17	1882	75.34	56.96	75.59	1072
BN cross (Native male X CSFL female)	2015-16	1886	69.93	46.02	65.08	863
	2016-17	3797	54.41	45.95	84.46	1745
ND cross (Native male X DR female)	2015-16	9726	75.63	49.62	65.08	48.27
	2016-17	4986	80.82	55.43	68.58	2764
BNxD cross	2015-16	10481	79.48	61.89	77.85	6487
	2016-17	13325	77.41	62.19	80.33	8287

production was 121.56 and 98.72 eggs under farm and field conditions, respectively, in BND cross (Table 74). During E-2, body weight at weeks was 565.04 and 503.00g under farm and field conditions respectively.

Germplasm supply

During the year, the germplasm supply was 14,023 chicks which reduced compared to previous

generation. The centres need to improve the germ plasm supply.

Receipt realized

The centre realized overall receipt of Rs. 7.98 lakhs which was 33.02% of the expenditure on feed cost (24.16 lakhs).

Table 73. Performance of different pure lines and cross

Traits	Tripura Black	Dahlem Red	Coloured Broiler (Dam line)	BN Cross (50%)
B. wt day old (g)	31.10 ± 0.60	37.80±0.45	45.20 ±0.42	36.85±0.38
4 wks	155.90± 3.89	225.16±8.00	436.55±10.77	219.54±8.15
8 wks	316.44± 8.30	544.24±16.12	1044.80±32.16	550.18±18.60
20 wks	1105.68±24.52	1720.28± 33.22	3240.42±60.82	1590 ± 41.55

Table 74. Performance of BND cross

Traits	Dual Type (BND cross) (E-1)		Dual Type (BND cross) (E-2)	
	Farm	Field	Farm	Field
B.wt day old (g)	41.39±0.62	40.05 ± 0.35	39.40±0.50	-
4 wks	243.67±8.34	239.88 ± 13.27	236.65±8.45	-
8 wks	547.09±17.04	433.44± 16.64	565.04±15.04	503.00± 21.75
20 wks	1806.04±54.46	1455 ± 23.58	1756.10±55.36	1595 ± 87.06
40 wks	2653.72±82.26	2078 ± 24.56	-	-
Age at first egg. (days)	165	174	-	-
Egg wt. (g) 40 wks	55.88 ± 0.39	50.12	-	-
EP (No) 40 wks	46.15		-	-
52 wks	82.50		-	-
72 wks	121.56	98.72		-

Nanaji Deshmukh Veterinary Science University Jabalpur

Programme activity assigned

- Evaluation and improvement of the local native chicken germ plasm and to be maintained as pure line.
- Procurement and evaluation of improved chicken germplasm in the local climatic condition
- Evaluation of new variety *Narmadanidhi* in different agro-climatic conditions.

Action taken

- The centre maintained Kadaknath, Jabalpur colour, CSML, M1 and M2 populations.
- During the current year, the centre evaluated G-7 generation of Kadaknath (Kd) and Jabalpur colour populations up to 56 weeks of age.
- CSML was procured from CARI, hatched and evaluated up to 40 weeks of age.
- The Narmadanidhi was evaluated in the field up to 52 weeks of age.
- M1 and M2 were conserved and evaluated.

Details of the implementation of programme and results achieved

The G-7 generation of Kadaknath and Jabalpur colour populations were evaluated up to 52 weeks of age. *Narmadanidhi* (25% Kd. 75% Jabalpur colour) birds were evaluated in farm and field up to 52 weeks of age. The centre also evaluated CSFL up to 40 weeks of age.

Selection records

The Jabalpur colour (JBL) population (G-7) was reproduced utilizing 49 sires and 294 dams and Kadaknath population (G-7) was reproduced

utilizing 48 sires and 288 dams (Table 75). The average effective selection differential was 13.18 and 13.91 in JBL and Kadaknatha populations and corresponding selection intensity was 0.29 and 0.34 respectively.

Table 75. Summary of selection record of Jabalpur colour and Kadaknath (G-7)

Particulars	Jabalpur colour	Kadaknath
Sires	50	49
Dams	300	294
Sires contributed	49	48
Dams contributed	294	288
Effective number	168	164.6
Rate of inbreeding	0.003	0.003
Expected sel. differential for male	15.13	1576
Expected sel. differential for female	13.91	14.10
Average sel. differential expected	14.52	14.93
Effective sel. differential for male	14.70	14.58
Effective sel. differential for female	11.66	13.24
Average sel. differential Effective	13.18	13.91
Selection intensity	0.29	0.34

Incubation records

The fertility remained above 80% in all the populations. The fertility improved marginally in all populations except in Jabalpur colour population as compared to previous generation. The hatchability on total eggs set reduced in Jabalpur colour and CSFL, whereas, it increased in Kadaknath and Narmadanidhi (Table 76).

Mortality

In G-7 generation the mortality was on higher side (5.2 to 9.10%) during brooding and (5.1 to 7.2%) during growing period in all populations (Table 77). The centre should take all precautions to reduce the mortality during brooding and growing periods.

Table 76. Incubation information of different populations

Strain	Generation	Fertility (%)	Chicks hatched (No.)	Hatchability (%)	
				TES	FES
Jabalpur colour line	G-6	85.26	3054	68.58	80.44
	G-7	80.35	2449	62.17	77.38
Kadaknath	G-6	84.25	1598	60.22	71.47
	G-7	86.19	1645	66.22	76.83
CSFL	2015-16	89.20	518	86.19	96.60
	2016-17	90.08	252	75.87	84.23
<i>Narmadanidhi</i>	2015-16	82.40	490	71.64	86.90
	2016-17	91.76	597	79.93	87.10

Table 77. Mortality percentage at different ages in last 2 generations

Strain	Generation	0-6 wks	7-18 wks	19-40 wks
Kadakhnath	G-6	11.8	6.80	3.80
	G-7	5.2	6.6	4.1
Jabalpur colour line	G-6	7.3	8.4	4.70
	G-7	8.3	7.2	3.2
CSFL	2015-16	13.5	16.9	13.10
	2016-16	9.1	6.1	5.9
Kadakhnath Crosses	2015-16	5.9	4.1	5.10
	2016-16	5.6	5.1	5.55
M1	2015-16	6.4	6.5	9.30
	2016-16	8.1	5.8	4.5
M2	2015-16	9.4	8.7	9.20
	2016-16	7.0	6.5	3.7

Performance of pure lines and different crosses under different management systems

During G-7 generation, the 6 week body weight was 381 and 864 g in Kadakhnath and Jabalpur population. The pullets of Kadakhnath and Jabalpur colour populations matured late by 2.1 and 1 days respectively. In Jabalpur colour, the egg weight at 40 weeks of age was 59.20 g, and in Kadakhnath, it was 47.60 g, respectively. The hen housed egg production up to 40 weeks of age was 86.80 eggs in JBL population and 50.30 eggs in Kadakhnath population. In CSFL 40 week egg weight and production were 57.00 g and 60.4 eggs, respectively (Table 78).

Narmadanidhi: Dual type chicken, *Narmadanidhi* was evaluated under farm and field conditions.

Table 78. Performance of growth and production traits in pure lines

Traits	Kadakhnath (G-7)		N	JBC (G-7)		CSML	
	N	Farm		N	Farm	Farm	
Body wt. (g) 6 wks	1431	381.2 ± 9.8	2151	864.9 ± 7.8	1063±9.30 * (pooled)		
20 wks	432	1129.3 ± 15.6 (F)	764	1808.2 ± 22.7 (F)	2193±22.6		
40 wks	414	1570.6 ± 18.4		2095 ± 24.6 (F)	2463.10 ± 27.30		
ASM (d)		168.1 ± 1.8		152 ± 2.1	176		
Egg wt. (g) 28 wks		40.30 ± 0.08		50.10 ± 0.16	-		
40 wks	414	47.6 ± 0.06	764	59.2 ± 0.13	57.00 ± 1.80		
EP (No.) 40 wks	414		764		60.40 ± 1.30		
HH		50.30		86.80			
HD		55.70		91.30			
Survivors'		53.50		88.40			
EP (No.) 52 wks	360		540				
HH		79.10		149.2			
HD		82.40		154.20			
Survivors'		80.60		150.80			

*5 week body weight

This variety produced 69 and 127 eggs up to 40 and 52 weeks at farm. It produced 43, 87 and 171 eggs, respectively, up to 40, 52 and 72 weeks in field conditions (Table 79). The egg production reduced both at farm and field conditions as compared to previous generation. This variety became more popular among the rural farmers and large number of chicks were supplied to the farmers.

Table 79. Performance of growth and production traits in *Narmadanidhi*

Traits	<i>Narmadanidhi</i>	
	Farm	Field
B.wt (g) 8 wks	1208.1±12.6	834.4±22.2
	947.8±10.6	698.2±16.7
20 wks	2187.2±18.3	1686±13.3
	1740±21.7	1351±11.5
40 wks	2532.2±23.6	2417.2±26.6
	1810.3±27.4	1682.5±27.1
ASM (d)	167	-
Egg wt. (g) 40 wks	49.2 ± 2.4	-
EP (No.) 40 wks	69.00 ± 3.10	43.50 ± 1.90
52 wks	127.29 ± 2.90	87.20± 7.40
72 wks	-	171.00 ± 6.30

Germplasm supply

The germplasm supplied during the year was 69,407 (chicks, grower and pullets).

Receipt realized

The center realized overall receipt of Rs.22.66 lakhs which was 76.14% of the expenditure on feed (29.76 lakhs).

Assam Agricultural University Guwahati

Programme activity assigned

- Evaluation and improvement of the local native chicken germ plasm and to be maintained as pure line.
- Procurement and evaluation of improved chicken germplasm in the local climatic condition
- Evaluation of new variety *Kamrupa* in different agro climatic conditions.

Action taken

- A total of 1453 day-old-chick of indigenous bird have been hatched out from which 724 numbers of adult male and female of 8 months of age are kept in the farm and their performances are under evaluation.
- A flock of 130 PB-2 males has been procured from the DPR, Hyderabad and evaluated.
- A flock of 1344 *Dahlem Red* bird is procured from DPR, Hyderabad and their performance was evaluated.
- A flock of 915 crossbred (PB-2 x Indigenous) have been produced and evaluated up to 52 weeks.
- A flock of 1150 crossbreds (PB-2 x Indigenous x *Dahlem Red*) have been kept in the centre and their performance was evaluated. up to 52 weeks in the farm and field conditions.

Details of the implementation of programme and results achieved

A total of 1453 chicks of native population were hatched and their evaluation was done up to 52 weeks of age. A flock of 130 PB-2 males has been procured from the DPR, Hyderabad and their performance was evaluated up to 52 weeks. A flock of 1344 *Dahlem Red* birds were procured from DPR, Hyderabad and their performance was evaluated up to 52 weeks.

Table 80. Summary of incubation and hatching

Strain	Year	Eggs set	Fertility (%)	Hatchability (%)		Good chicks hatched
				TES	FES	
Indigenous	2015-16	2327	77.09	61.41	79.65	1429
	2016-17	2385	76.98	60.92	79.14	1453
BN cross	2015-16	1856	63.25	48.22	76.23	895
	2016-17	1895	78.01	48.28	76.12	915
BND cross	2015-16	31125	76.91	68.85	89.51	24310
	2016-17	32895	77.20	68.66	88.94	25,524

The BN (PB-2 X native) cross chicks were produced and evaluated up to 52 weeks of age. *Kamrupa* [(PB-2 x Indigenous) x *Dahlem Red*] was also evaluated up to 52 weeks of age under farm and field conditions.

Incubation records

Summary of incubation records has been presented in Table 80. The fertility was above 76% in all the populations. The hatchability on total eggs set ranged from 48.28 to 68.66%. The centre need to take all possible measures to improve fertility and hatchability.

Mortality

The mortality during the current year is presented in Table 81. The mortality during brooding and growing period was below 3.42% in all the lines. The mortality during laying period was less than 1%. The mortality was well below the prescribed level.

Table 81. Mortality at different periods (weeks)

Strain	Year	0-5	6-20	21-40	41-52
Native	2015-16	2.65	1.36	0.29	0.36
	2016-17	2.62	1.69	0.29	0.07
PB-2	2015-16	3.33	2.06	2.11	1.43
	2016-17	2.30	0.78	0.79	0.80
<i>Dahlem Red</i>	2015-16	3.15	2.62	0.97	0.82
	2016-17	3.42	2.00	0.55	0.15
BN cross	2015-16	1.11	0.45	0.45	0.34
	2016-17	1.09	0.33	0.11	Nil
BND cross	2015-16	3.80	2.02	0.71	0.85
	2016-17	2.95	1.70	0.54	0.10

Performance evaluation of germplasm

The juvenile and production traits in indigenous, PB-2 and *Dahlem Red* are presented in Table 82. The 5 week body weight was 118.12 g in indigenous, 1065.39g in PB-2 and 365.17g in *Dahlem Red*. The ASM was lowest in *Dahlem Red* (160 days) and highest in indigenous (178 days). Indigenous birds matured early by 2.25 days and *Dahlem Red* pullets by 1.95 days compared to previous generation. In native population, the egg weight and egg production up to 52 weeks was 39.85 g and 64.90 eggs, respectively. In *Dahlem Red* egg production improved by 1 egg.

Performance of crosses

The five weeks body weight was 250.40 g and FCR was 3.10 in BN cross. The age at sexual maturity was 171.10 days and remained similar as compared to previous generation. The hen housed egg production up to 52 weeks was 70.16 eggs. Almost all the parameters are same as compared to previous generation.

The *Kamrupa* variety was evaluated up to 52 weeks in farm and field conditions during the current year. The 5 week body weight was 220.40g and 180.35g in the farm and field, respectively. The age at sexual maturity was 150.65 days in the farm and 172.90 days in the field. The egg weight at 40 weeks of age was 53.60 and 40.10g, respectively, in farm and field,

respectively. The hen housed egg production upto 40 and 52 weeks of age was 47.10 and 87.60 eggs in the farm and corresponding values in the field were 42.10 and 71.60 eggs, respectively. The performance of cross was constant over last two generations (Table 83 & 84).

Table 83. Juvenile and production performance of two way cross

Traits	BN cross	
	Farm	
	N	Mean ± SE
B. Wt (g) at Day old	450	33.10 ± 5.10
5 wks	400	250.40 ± 26.10
20 wks	375	1590.30 ± 128.70
40 wks	355	2510.15 ± 295.70
FCR up to 5 week	400	3.10
Conformation traits at 5 week of age		
Shank length (mm)	400	51.35 ± 4.10
Keel length (mm)	400	52.70 ± 6.25
Breast Angle (o)	400	64.35 ± 6.60
ASM (days)	210	170.10 ± 5.20
Egg wt. (g) at		
32 wks	200	44.20 ± 2.65
40 wks	180	47.98 ± 5.61
52 wks	160	56.85 ± 3.65
EP. (No.)		
40 wks		
Hen housed	210	38.10
Hen day	-	39.25
Survivors'	180	40.65
EP. (No.)		
52 wks		
Hen housed	210	70.16
Hen day	-	71.56
Survivors'	160	71.98

Table 82. Juvenile and production traits in pure lines

Traits	Native		PB-2		Dahlem Red	
	N	Mean ± SE	N	Mean ± SE	N	Mean ± SE
B. Wt (g) Day old	650	30.16 ± 2.45	130	45.23 ± 4.16	550	38.61 ± 2.65
5 wks	600	118.12 ± 6.10	120	1065.39 ± 70.75	510	365.17 ± 62.54
20 wks	560	1005.21 ± 60.25	105	2615.70 ± 180.25	480	1260.42 ± 91.45
40 wks	510	1506.10 ± 82.50	80	3510.50 ± 415.20	430	1665.60 ± 250.60
FCR up to 5 week	600	3.29	120	2.69	510	2.60
Conformation traits at 5 weeks						
Shank length (mm)	600	46.82 ± 1.56	120	75.10 ± 4.96	510	59.31 ± 2.85
Keel length (mm)	600	49.23 ± 2.29	120	85.90 ± 6.15	510	52.10 ± 2.69
Breast angle (o)	600	57.20 ± 3.12	120	71.80 ± 4.15	510	63.25 ± 5.65
ASM (days)	320	178.25 ± 6.90	-	-	360	160.15 ± 6.12
Egg wt. (g) at						
32 wks	280	36.10 ± 2.50	-	-	320	48.80 ± 4.15
40 wks	260	36.96 ± 2.43	-	-	300	57.90 ± 6.10
52 wks	240	39.85 ± 3.95	-	-	260	60.50 ± 4.95
EP. (No.)						
40 wks						
Hen housed	320	36.20	-	-	360	60.10
Hen day	-	37.45	-	-	-	61.56
Survivors'	280	37.85	-	-	310	63.25
EP. (No.)						
52 wks						
Hen housed	320	64.90	-	-	360	114.15
Hen day	-	66.20	-	-	-	115.25
Survivors'	250	67.60	-	-	290	116.10

Table 84. Juvenile and production performance of three way cross

Traits	Kamrupa (BND cross)			
	Field		Farm	
	N	Mean \pm SE	N	Mean \pm SE
Body wt. (g) at Day old	400	35.40 \pm 2.85	600	35.40 \pm 2.80
5 wks	370	180.35 \pm 6.10	550	220.40 \pm 42.56
20 wks	290	910.20 \pm 86.10	530	1120.40 \pm 165.25
40 wks	250	1595.20 \pm 310.25	500	1995.60 \pm 415.50
FCR up to 5 weeks	370	-	550	2.75
Conformation traits at 5 weeks of age				
Shank length (mm)	370	47.85 \pm 2.80	550	46.85 \pm 2.80
Keel length (mm)	370	51.90 \pm 5.15	550	47.95 \pm 5.10
Breast Angle (o)	370	51.60 \pm 4.65	550	65.20 \pm 6.20
ASM (days)	160	172.90 \pm 6.10	260	150.65 \pm 4.50
Egg wt. (g) at 32 wks	250	38.80 \pm 2.65	260	49.10 \pm 4.30
40 wks	210	40.10 \pm 5.65	240	53.60 \pm 2.85
52 wks	200	41.65 \pm 5.30	230	56.95 \pm 3.90
EP. (No.) 40 wks				
Hen housed	160	42.10	260	47.10
Hen day	-	42.85	-	48.20
Survivors'	150	43.65	240	51.10
EP. (No) 52 wks				
Hen housed	160	71.60	260	87.60
Hen day	-	72.90	-	89.50
Survivors'	140	74.10	210	91.80

Germplasm supply

The centre supplied 25,021 (3105 hatching eggs and 22,006 chicks of *Kamrupa*) germplasm to farmers. The centre should take all steps to improve germ plasm supply.

Receipt realized

The center realized receipt of Rs. 4.27 lakhs during the financial year which is 33.75% of expenditure on feed cost (Rs. 12.65 lakhs).

Birsa Agricultural University

Ranchi

Programme activity assigned

- Evaluation and improvement of the local native chicken germplasm and to be maintained as pure line.
- Procurement and evaluation of improved chicken germplasm in the local climatic condition.
- The centre will work on development of new varieties suitable for rural poultry in the region utilizing local native germplasm.

Action taken

- The dual purpose rural variety, *Jharsim* developed by the centre was released by Hon'ble DDG (Animal Science) on 11th April, 2016.
- The centre evaluated G-5 generation of native population upto 60 weeks of age.
- In *Dahlem Red* (G-4) was evaluated from 20-60 weeks of age. And G-5 generation was reproduced and evaluated up to 16 weeks.
- The layers of BN cross was evaluated up to 60 weeks during E-4 evaluation. The E-5 evaluated up to 16 weeks.
- During evaluation-5 (E-5) DBN crosses were evaluated 60 weeks in farm conditions and E-6 was evaluated up to 20 weeks in farm condition.

Details of the implementation of programme and results achieved

The centre evaluated G-5 generation of native population upto 60 weeks of age. The *Dahlem Red*

(G-4) was evaluated from 20-60 weeks of age and G-5 generation was reproduced and evaluated up to 16 weeks. The layers of BN cross was evaluated up to 60 weeks during E-4 evaluation and the E-5 was evaluated up to 16 weeks. E-5 of DBN cross was evaluated up to 60 weeks in farm conditions and E-6 was evaluated up to 20 weeks in farm condition.

Incubation records

The fertility ranged from 82.37 to 95.32% in all the lines during current year (Table 85). The fertility improved marginally in all the lines as compared to previous generation. The hatchability on total eggs set ranged from 65.14 to 78.19% and it improved marginally in all the populations. In the current year, hatchability on fertile eggs set ranged from 75.52-82.03% in all the lines. Centre should take all possible steps to improve the hatchability. The centre should hatch sufficient number of chicks in native germplasm as per technical program.

Mortality

Mortality during brooding period though reduced, it was on higher side and ranged from 2.13-9.28% (Table 86). Mortality during growing stage was also slightly on higher side ranging from 2.76-6.65%. During laying period mortality was ranged from 2.36-5.54%. The centre has to take all the necessary precautions to contain mortality at all stages in all the lines.

Table 85. Summary of incubation and hatching

Strains	Year	Eggs set	Fertility (%)	Hatchability (%)		Chicks hatched (No.)
				TES	FES	
Native	2015-16	1098	80.32	64.29	80.04	702
	2016-17	205	82.37	65.14	79.08	329
<i>Dahlem Red</i>	2014-15	750	87.73	68.13	77.66	505
	2016-17	710	88.59	69.15	78.06	491
BND cross	2015-16	1670	89.88	71.01	79.01	1176
	2016-17	705	90.35	70.49	78.02	497
<i>Jharsim</i> (DBN cross)	2015-16	3640	94.01	77.03	81.94	2789
	2016-17	5880	95.32	78.19	82.03	4598
BN cross	2015-16	715	88.67	69.37	78.23	490
	2016-17	140	90.71	70.71	77.95	99

Table 86. Mortality at different weeks

Breeds/strains	Year	0-6 wks	7-18 wks	19-40 wks
Native	2015-16	13.30	9.65	6.37
	2016-17	6.34	5.25	5.54
<i>Dahlem Red</i>	2015-16	10.39	8.22	12.57
	2016-17	5.11	6.32	4.38
PB-2	2015-16	-	2.24	5.37
	2016-17	3.45	2.76	4.47
BN Cross	2015-16	4.33	5.39	5.22
	2016-17	2.13	3.48	2.36
BN X D cross	2015-16	16.27	9.84	12.52
	2016-17	9.28	6.65	5.53
<i>Jharsim</i> (DBN cross)	2015-16	14.37	4.02	12.56
	2016-17	8.45	5.49	4.47

Performance evaluation of germplasm

In native population, production traits were evaluated from 64 weeks of age during G-5 generation (Table 87). The hen housed egg production up to 64 weeks was 67.78 eggs in native population during G-5 and it improved by 6.97 eggs compared to previous generation. In *Dahlem Red*, the hen housed egg production up to 64 weeks was 115.62 eggs in G-4 generation. In BN cross (E-4) hen housed egg production up to 64 weeks of age was 87.51 eggs.

In three way crosses, 4, 8 and 20 week body weights were better in DNB cross during E-5 evaluation.

(Table 88). The hen day egg production up to 64 weeks of age was more in DNB cross (101.42 eggs) than BND cross (93.17 eggs) during E-5 evaluation under farm conditions.

Table 88. Performance of three way crosses in the farm

Traits	BND (E-5)	Jharsim-DBN (E-6)
Body wt. (g) day old	29.70±0.19	29.70±0.19
4 wks	183.42±1.11	183.42±1.11
8 wks	535.26±4.488	535.26±4.488
20 wks	M 1477.26±8.04 F 1314.06±6.32	1477.26±8.04 1314.06±6.32
Age at first egg (d)	168	(E-5) 174
EP. (No.) 40 wks HD (E-5) HH	34.72 33.04	36.45 35.47
EP. (No.) 52 wks HD (E-5) HH	67.39 63.04	71.32 67.48
EP. (No.) 60 wks HD (E-5) HH	93.17 87.16	101.42 95.94

Germplasm supply

Centre supplied 15,103 (4822 hatching eggs and 10281 chicks) germplasm to the farmers and reduced compared to previous year. The centre should improve germplasm supply.

Receipt realized.

The center realized a receipt of Rs. 8.90 lakhs during the financial year which is 50.28% of expenditure on feed cost (Rs. 17.70 lakhs).

Table 87. Performance of different breeds/strains

Traits	Native (G-5)	Dahlem Red (G-5)	BN cross (E-5)
Body wt. (g) day old	29.38±0.23	31.71±0.20	28.02±0.16
4 wks	159.94±1.37	196.62±0.94	180.21±1.38
8 wks	406.90±3.89	584.89±3.45	506.20±5.29
20 wks		(G-4)	
M	1489.58±4.52	1412.88±13.68	1323.87±13.37
F	1174.44±5.94	1202.46±5.53	1101.77±6.21
Egg wt. (g) 40 wk	42.40±0.39	49.56±0.47	
Age at first egg (d)	176	158	(G-4) 163
EP. (No.) 40 wks			
HD	31.05	38.55	32.24
HH	30.06	37.74	31.43
EP. (No.) 52 wks			
HD	58.39	76.22	69.13
HH	55.59	73.82	66.53
EP. (No.) 64 wks			
HD	71.28	119.39	90.92
HH	67.86	115.62	87.51

CSK Himachal Pradesh Krishi Viswavidyalaya Palampur

Programme activity assigned

- Collection and evaluation of the local native chicken.
- Procurement and evaluation of improved chicken germplasm in the local climatic condition.
- Production and evaluation of crosses of local native birds with improved germplasm.
- The centre will work on development of new varieties suitable for rural poultry in the region utilizing local native germplasm.

Action taken

- In native germplasm G-4 generation was evaluated up to 52 weeks.
- The *Dahlem Red* population evaluated (G-4) upto 52 weeks and G-3 generation was evaluated from 52-72 weeks of age. The G-5 generation of *Dahlem Red* was reproduced.
- The *Dahlem Red* X Native cross was produced and evaluated up to 52 weeks of age
- The chicks of DR x Native male with DR females cross have been produced and evaluated in farm upto 40 weeks and in the field upto 40 weeks. The DND cross birds continued from previous year was evaluated from 52-72 weeks.
- The centre has Evaluated the DND cross under farm and field conditions satisfactorily and it is ready for release for the benefit of farmers of Himachal Pradesh.

Details of the implementation of programme and results achieved

Local germplasm

A total of 5688 native chicks in G-4 generation were produced at hatchery by collecting fertile eggs from farm. Cross of DN and DNxD crosses were made and the evaluation is in progress.

Improved germplasm

The *Dahlem Red* population was valuated up to 52 weeks of age (G-4).

Incubation records

The summary of incubation records for various pure lines and crosses have been presented in Table 89. The fertility was good and ranged from 81.33 to 87.22% in all the populations except in *Dahlem Red* population (61.41%). The hatchability on total and fertile eggs set reduced in all the populations compared to previous generation. The hatchability was alarmingly low in *Dahlem Red* population (TES-18.23% and FES-28.30) Over all fertility is good and hatchability needs further improvement. The centre need to initiate pedigree hatching in native population. The fertility and hatchability reduced in comparison to previous generation. Centre needs to take all the possible steps to improve fertility and hatchability.

Table 89. Summary of incubation and hatching

Strain/ cross	Year	Egg set	Fertility (%)	Hatchability (%)		Good chicks hatched (No.)
				TES	FES	
Native	2015-16	6718	93.97	68.01	72.37	4569
	2016-17	9790	85.17	57.89	67.96	5668
<i>Dahlem Red</i>	2015-16	618	87.37	69.74	79.81	431
	2016-17	916	64.41	18.23	28.30	167
DN Cross	2015-16	2738	91.52	71.61	78.25	1961
	2016-17	8438	87.22	66.81	76.60	56.38
DN x D cross	2015-16	20352	84.44	58.08	68.77	11821
	2016-17	50724	81.33	54.10	66.51	27443

Mortality

The mortality in the current year during 0-5 weeks was very high ranging from 3.12 to 18.71% in all the populations except *Dahlem Red* (3.12%) (Table 90). Mortality was very high during 6-20 weeks also ranging from 4.36 to 20.95%. The mortality during 21-52 weeks was high (3.20-10.40%) in all the populations which needs attention. Centre has to take precautions to reduce the mortality at all ages in all the lines and proper bio-security measures have to be adopted to reduce the mortality.

Table 90. Mortality per cent at different weeks

Strain/ cross	Year	0-6 wks	7-20 wks	21-40 wks
<i>Dahlem Red</i>	2015-16	7.74	17.4	13.61*
	2016-17	3.12	4.36	10.40
Native	2015-16	11.12	15.88	16.08*
	2016-17	11.72	20.95	3.20
DN cross	2015-16	7.46	13.60	25.69*
	2016-17	13.20	4.14	3.84
DNxD cross	2015-16	10.24	24.77	14.83*
	2016-17	18.71	12.79	5.00

*21-52 weeks

Performance evaluation of germplasm

During the current year, *Dahlem Red*, Native, DN and DNxD population were evaluated (Table 91). The 4 week body weight was 257.35, 189.04 and 223.20 g in *Dahlem Red*, native, and DRxN populations, respectively. The egg weight was

53.72, 45.46 and 50.20g, respectively, in *Dahlem Red*, native and DRxN population at 40 weeks. The egg weight reduced in *Dahlem Red* and DRxN cross as compared to previous generation. The hen housed egg production in *Dahlem Red* was 67.93 eggs up to 40 weeks of age whereas native population recorded 40.10 eggs. The hen housed egg production upto 52 weeks of age was 103.90, 60.62 and 106.17 eggs in *Dahlem Red*, native and DRxN populations, respectively. The 52 week egg production showed improvement in *Dahlem Red* Population. The DNxD cross was evaluated under farm and field conditions up to 40 weeks of age (Table 92). The 20 week body weight was 1465.30 g in farm and 1453.60 g in field condition. The egg weight at farm was 53.30 and in field condition was 52.62 g. The hen housed egg production in DNxD cross was 65.74 eggs in farm and 39.54 eggs in field conditions up to 40 weeks. This cross should improvement of 12.96 egg at farm compared to previous generation. This cross produced 148.54 eggs up to 72 weeks of age.

Table 91. Mean and SE for body weights and production traits

Traits	DR (G-4)		Native (G-4)		DR X N		
	N	Mean±SE	N	Mean±SE	N	Mean±SE	
Body wt. (g) day old	1089	36.81±0.30	495	31.29 ±0.46	250	36.63±0.40	
4 wks	1069	257.35±5.14	451	189.04±1.52	220	223.20±6012	
20 wks	881	1600.34±11.60	371	1427.97±20.21	116	1524.80±20.50	
40 wks	830	1950.00±11.94	200	1549.14±21.58	114	1605.00±17.70	
FCR (0-4 wks)	1069	2.71	451	3.64	-	3.13	
ASM (d)	545	183	192	203	148	175	
Egg wt. (g) 28 wks	300	50.45±0.28	150	40.60±0.11	60	49.10±0.80	
40 wks	300	53.72±0.41	150	45.46±0.36	50	50.20±0.50	
EP40 (No.)	HH	878	67.93	200	40.10	114	62.41
	HD	826	72.48	192	42.02	112	63.03
	Survivors'	756	79.30	185	43.03	112	63.52
EP52 (no) HH		878	103.90	120	60.62	114	94.07
	HD	788	115.62	112	65.20	109	98.16
	Survivors'	687	132.79	106	68.80	101	106.17
EP52 (No.)	HH	560	111.38	-	--	-	-
	HD	562	142.88				
	(G-3)						

Table 92. Mean and SE for body weights and production traits in DND crosses

Traits	DND			
	Farm		Field	
	N	Mean±_SE	N	Mean±_SE
Body wt. (g) 0 day	227	38.23±0.56	361	38.97±0.65
4 wks	217	197.40±2.10	361	175.53±3.45
20 wks	86	1465.30±13.60	55	1658.82±23.65(M) 1248.39±12.44(F)
40 wks	85	1585.40±15.30	123 20	2150.49±34.93(M) 1524.28±16.68(F)
FCR (0-4 week)		3.54		-
Age at 50% production (days)	86	175	133	186 (Age at first egg)
Egg wt. (g) 28 wks	50	51.20±0.20		49.55±0.47
40 wks	50	53.30±0.35		52.62±0.56
EP40 (No.) HH	86	65.74	101	39.54
HD	80	70.28	88	45.14
Survivors'	77	73.38		
EP72 (No.) HH	111	148.54	-	-
HD	89	159.38		
(Previous Evaluation)				

Germplasm supply

The centre supplied 36,599 chicks of various crosses to farmers.

Receipt realized

The center realized receipt of Rs. 12.64 lakhs during the financial year which is 73.37% of expenditure on feed cost (Rs. 17.22 lakhs).

Maharana Pratap University of Agriculture & Technology, Udaipur

Programme activity assigned

- Evaluation and improvement of the local native chicken germ plasm and to be maintained as pure line.
- Procurement and evaluation of improved chicken germplasm in the local climatic condition
- Evaluation of *Pratapdhan* in different agro climatic conditions.

Action taken

- Evaluated G-6 generation of *Mewari* breed up to 52 weeks of age and G-7 generation was reproduced
- *Pratapdhan* (BNR cross) was evaluated up to 72 weeks during E-5 and up to 20 weeks in E-6.
- *Pratapdhan* a dual purpose variety for rural poultry developed by MPUAT, Udaipur started supply to rural farmers of Udaipur.
- Local native germplasm of have been registered as new indigenous chicken breed in in as *Mewari* chicken breed and accession number given by NBAGR, Karnal is INDIA_CHICKEN_1700_MEWARI_12016.

Details of the implementation of programme and results achieved

Mewari population was evaluated from 52-72 weeks of age during G-5 generation and G-6 generation was up to 52 weeks of age. *Pratapdhan* (BNR cross) was evaluated up to 72 weeks during E-5 and upto 20 weeks during E-6 evaluations.

Incubation records

The center regenerated G-6 generation of *Mewari* chicken population as well as RIR, CSFL BN and BNR populations. The fertility ranged from 72.73- 87.85% in all the populations (Table 93). The fertility decreased in *Mewari* chicken and BxN cross populations and it remained almost same in *Pratapdhan*. The hatchability on total eggs and fertile set decreased in *Mewari*, BN cross and *Pratapdhan*. The centre has to improve over all fertility and hatchability.

Mortality

The Mortality in various populations is presented in Table 94. The mortality was on higher side (7.41 to 10.26) in all the populations. During growing period mortality was on higher side (7.59- 13.86) in all the populations except in CSFL population (3.90). The mortality in general is on higher side and the centre need to take all possible measures to keep mortality under control.

Table 94. Mortality (%) records

Strain/ breed/ cross	Gen/ Year	0-5 wks	6-20 wks	21-40 wks	41- 52 wks
<i>Mewari</i>	G-5	10.37	14.65	23.42	14.47
	G-6	10.26	13.86	8.44	10.61
RIR	(G-4)	2.76	7.63	15.10	-
	G-5	7.41	8.19	10.66	5.24
CSFL	2015-16	5.65	17.79	3.85	-
	2016-17	8.07	3.90	3.55	2.11
BN cross	2015-16	5.58	7.65	10.31	-
	2016-17	10.74	9.65	5.82	2.11
<i>Pratapdhan</i> (BNR cross)	2015-16	4.67	9.44	10.29	6.90
	2016-17	7.75	7.59	5.57	-

Table 93. Summary of incubation and hatching results

Strain/ breed/ cross	Year	Eggs set (No.)	Fertility (%)	Hatchability (%)		Good Chicks Hatched (No.)
				TES	FES	
<i>Mewari</i> chicken	2015-16 (G-6)	4960	79.91	62.74	78.51	3127
	2016-17 (G-7)	3918	75.27	57.08	75.84	2210
RIR (Anand)	2015-16	7350	84.51	70.37	83.19	5210
	2016-17	-	-	-	-	-
CSFL	2015-16	420	78.81	58.10	73.36	244
	2016-17	420	87.85	72.62	82.66	305
BN cross	2015-16	3898	84.71	75.81	89.49	2957
	2016-17	4513	72.73	64.20	88.23	2893
<i>Pratapdhan</i>	2015-16	1,00,769	80.36	69.25	86.03	70,509
	2016-17	1,10,842	79.21	63.44	77.85	70,318

Performance evaluation of germplasm

In *Mewari* population the juvenile body weights at 8 weeks marginally reduced during G-6 generation as compared to G-5 generation (Table 95). The 20 weeks body weight reduced by 84.69 g and 40 weeks body weight by 140.49g in G-6 generation as compared to G-5 generation. The pullets matured 3.11 days early as compared to previous (G-5) generation. The hen housed and hen day egg production upto 52 weeks was 38.88 and 65.07 eggs, respectively, in S-6 generation. During S-5 generation, hen housed and hended egg production was 54.92 and 92.92 eggs, respectively, up to 72 weeks of age.

Table 95. Performance of growth and production traits in different pure lines germplasm

Traits	G-5		G-6	
	N	Mean±SE	N	Mean±SE
B.Wt (g) 0 day	1483	31.53±0.12	2257	31.67±0.15
8 wks	668	651.75±4.33	1115	633.43±2.50
20 wks*	439	1411.86±17.53	660	1327.17±7.41
40 wks	377	1615.37±16.43	597	1474.47±9.46
ASM (d)		174.73		171.62
E.wt (g) 28 wks	270	41.86±0.14	249	41.26±0.20
40wk	296	45.98±0.12	336	45.24±0.20
EP 40 wks (No.)	296	28.81	336	30.35
HH				
HD		46.92		44.89
Survivors'		49.32		50.37

EP 52 wks (no)		39.96		38.88
HH				
HD		70.58		65.07
Survivor		104.79		64.52
EP 72 wks (no)		54.92		-
HH				
HD		92.92		-

*Data from 20 weeks of age are for female before 20 weeks in pooled sex

Evaluation of Pratapdhan

Pratapdhan was evaluated from 52-72 weeks of age during E-5 evaluation and during E-6 evaluation was done upto 20 weeks of age (Table 96). The age at sexual naturity was 144.54 days during E-5 and 157.61 days during E-6. In E-5, the hen housed and hen day egg production was 96.29 and 170.89 eggs up to 72 weeks of age The hen housed and hended egg production up to 72 weeks has improved in E-5 as compared to E-4 evaluation. During E-6, evaluation is in progress beyond 20 week.

Germplasm supply

A total of 78,225 germplasm was supplied during the current year.

Revenue generation

The center realized a receipt of Rs. 20.69 lakhs during the current financial year which is 77.46% of expenditure on feed cost (26.71 lakhs).

Table 96. Performance of growth and production traits in Pratapdhan

Traits	Pratapdhan			
	E-3	E-4	E-5	E-6
Body wt. (g) day old	-	39.32±0.17	40.31±0.11	38.23±0.19
2 wks	185.83±1.03	173.02±1.91	169.67±1.16	126.62±0.58
4 wks	321.06±2.57	314.01±4.06	326.35±2.56	295.07±2.18
8 wks	695.28±15.94	682.73±8.26	693.38±5.31	646.66±8.09
20 wks*	1782.01±19.47	1796.42±26.50	1720.62±21.71	1911.73±27.61
40 wks	2287.95±35.38	2032.04±30.44	2035.58±25.84	-
Age at 1 st egg of the flock	124	133	127	138
ASM (d)	143.10±1.59	151.27±1.41	144.54±0.55	157.61±0.78
EW (g)				
28 wks	48360±0.47	47.06±0.19	47.13±0.18	47.74±0.22
40 wks	52.91±0.52	52.85±0.13	53.79±0.11	-
EP 40 wks (No.) HD	55.30	51.24	80.86	-
HH	31.44	38.08	62.91	-
Survivors'	90.18	82.50	122.90	-
EP 52 wks (No.) HD	83.68	86.41	105.01	-
HH	40.92	55.17	75.59	-
Survivors'	165.19	119.54	171.33	-
EP 72 wks (No.) HD	160.90	159.12	170.89	-
HH	53.91	80.15	96.29	-

*values for females only from 20 weeks onward before 20 weeks in pooled sex

ICAR-Directorate of Poultry Research Hyderabad

Programme activity assigned

- Maintenance and evaluation of random-bred control population for egg.
- Maintenance and evaluation of random-bred control population for meat.
- Supply of control population stocks to all AICRP centres except CARI, Izatnagar.

Action taken

- The random-bred control populations for egg and a new synthetic coloured control population for meat were regenerated.
- Hatching eggs from layer and meat control populations were made available to different AICRP centres during the year.

Details of the implementation of programme and results achieved

I) Maintenance and Evaluation of Random-Bred Control Population for Egg

During 1996-97, the existing layer control population was replaced with the approval of the research advisory committee, as it had low egg weight and was having high mortality. A synthetic population that was originated from the AICRP and commercial populations at GAU, Anand was considered to be useful for this purpose and in the population available at PD on Poultry was under a mild positive selection for egg production. The selection was relaxed and matings were arranged among 70 randomly chosen males and 350 randomly chosen females to reproduce the base generation of the layer control LC-0. The LC-1 was reproduced with 60 sires and 300 dams in two hatches. The LC-2 generation was reproduced utilizing 40 sires and 200 dams in three hatches. The LC-4, LC-5, LC-6, LC-7 and LC-8 generations were reproduced using 40 sires and 200 dams. LC-9 and LC-10 generation was reproduced using 32 sires and 128 dams and 37 sires and 74 dams, respectively. The inbreeding coefficient was kept at minimum level. At the time of housing only two males per sire family and two females per dam family were housed for recording of production and other body weight traits according to the technical programme.

Regeneration of LC-11 generation

The number of sires and dams used to regenerate LC-12 generation, effective population size and rate of inbreeding are presented in Table 1. The effective population size for LC-12 was 160 and inbreeding coefficient was 0.0003.

Table 1. Number of sires and dams, effective population size and rate of inbreeding over generation

Generation	No. of Sires	No. of Dams	Effective population size (Ne)	Rate of inbreeding (ΔF)
LC-7	40	200	200.00	0.00250
LC-8	40	200	200.00	0.00250
LC-9	32	128	157.54	0.00488
LC-10	37	74	169.14	0.00507
LC-11	50	200	246.15	0.00313
LC-12	50	200	160.00	0.003

Incubation records

Incubation records of LC-12 generation in layer control population have been presented in Table 2. Fertility, hatchability on total eggs set and hatchability on fertile eggs set respectively were 62, 53 and 85%. Fertility and hatchability decreased in the current generation as compared to previous generation.

Table 2. Incubation records layer control population

Generation	Fertility (%)	Hatchability (%)	
		FES	TES
LC-7	81.5	89.3	66.2
LC-8	78.5	91.6	71.9
LC-9	85.1	92.3	78.5
LC-10	70.2	84.2	59.1
LC-11	70.9	87.0	61.7
LC-12	62	85	53

Production performance

During the year 2016-17, the birds of LC-12 generation were evaluated up to 64 weeks of age. The performance of control population and their regression value (time trend of control) has been presented in the following Table 3. The traits like body weight at 16 and 40 weeks of age, age at sexual maturity, 40 weeks egg weight and egg production to 40 weeks and 64 weeks (up to LC-12) showed non-significant change and the control population appears to be stable for all the traits for last twelve generations.

Table 3. Performance of layer control population for growth and production traits

Generation	Body weight (g)		ASM (days)	Egg weight 40 wks (g)	Egg production to 40 weeks (No.)	
	16 weeks	40 weeks			40 wks	64 wks
LC-7	978	1511	148.1	50.90	93.13	189.1
LC-8	1010	1473	151.6	52.65	85.44	173.1
LC-9	1048	1510	154.9	52.91	91.47	200.7
LC-10	954	1508	155.4	53.28	92.64	194.4
LC-11	886	1497	156.4	51.28	94.90	223
LC-12	914	1522	150.1	52.88	98.00	224
b±S.E	0.81 ^{NS} ±31.00	-3.72 ^{NS} ±2.5	0.76 ^{NS} ±0.37	-0.04 ^{NS} ±0.10	-0.45 ^{NS} ±0.41	1.12 ^{NS} ±0.95

ii) Maintenance and evaluation of random-bred control population for meat

During the period-14 generation of the control broiler was evaluated for juvenile traits and for production traits.

Incubation records

Incubation records of G-15 generation in broiler control population have been presented in Table-1. Percent fertility, percent hatchability on total eggs set and percent hatchability on fertile eggs set respectively were 73.68, 63.65 and 89.10. Both fertility and hatchability were improved in the current generation as compared to previous generation.

Table 4. Incubation records of broiler control population

Generation	Fertility (%)	Hatchability (%)	
		TES	FES
G-14	62.67	54.81	87.46
G-15	73.68	63.65	89.10

Juvenile body weights

Performance of juvenile traits in control broiler population over 15 generation is presented in Table 2. During the current generation body weight at 5 weeks and 6 weeks respectively were 570g and 836g. After six weeks of age 500 female chicks and 150 male chicks representing all the sires and dams were saved and were being maintained under restricted feeding schedule. At the time of housing only 2 males per sire family 2 females per dam family were housed for recording of production traits. The regression estimates of generation mean on generation number for 5 week body weight and 6 week body weight showed non significant changes over generations indicating the stability of the broiler control population for juvenile body weights.

Table 5. Performance of juvenile body weights (g) in broiler control population

Generation	5 wks	6 wks
G-1	822	1060
G-2	872	1141
G-3	731	995
G-4	897	1195
G-5	907	1106
G-6	672	891
G-7	592	783
G-8	929	1215
G-9	626	964
G-10	578	829
G-11	522	720
G-12	731	1156
G-13	573	993
G-14	520	663
G-15	570	836
b±S.E	-23.71 ^{NS} ±8.66	-20.36 ^{NS} ±11.76

Production traits

A total of 300 females were maintained till 40 weeks of age to record the traits like age at sexual maturity, body weights at 20 and 40 weeks of age, egg weight at 32 and 40 weeks of age and egg production to 40 weeks of age. The mean for all these traits were presented in Table 6. The hatching eggs of this population were being supplied to the AICRP centers as and when they require for evaluation of their selected lines. The consolidated production performance of broiler control over generations has been presented in the in Table 3. The regression estimates of generation means on generation number (G0 to G-15) showed non-significant changes over the generations in all the traits (Table 6) indicating the stability of the broiler control.

Table 6. Growth and production performance of broiler control population over generations

Gen.	BW 20 wks (g)	BW 40 wks (g)	ASM (days)	EWT 32 wks (g)	EWT 40 wks (g)	Egg Prod 40 wks (No)
G-0	2509	3150	177	54.02	60.50	47.00
G-1	2536	3256	164	52.00	54.90	45.90
G-2	2776	3370	163	51.07	57.55	66.67
G-3	2670	3487	162	53.32	58.09	65.37
G-4	2591	3478	163	53.99	58.12	65.07
G-5	2559	3524	162	51.56	54.67	57.47
G-6	2130	2886	173	53.06	58.87	58.65
G-7	2457	3335	165	53.39	56.61	57.27
G-8	2436	3222	167	54.32	57.00	60.00
G-9	1941	3005	171	51.44	57.28	53.38
G-10	1982	2799	194	51.66	55.10	57.06
G-11	1885	2933	189	51.40	57.27	54.30
G-12	2369	3139	170	52.20	56.43	56.59
G-13	2279	3033	174	50.96	55.80	55.82
G-14	2416	3151	182	52.50	56.20	56.59
G-15	2296	3098	182	51.23	58.68	56.0
b±S.E	-31.39 ^{NS} ±15.69	-23.79 ^{NS} ±15.57	1.24 ^{NS} ±0.69	-0.100 ^{NS} ±0.85	-0.121 ^{NS} ±0.12	0.021 ^{NS} ±0.50

Critical Observations

KVASU, Mannuthy

Accomplishments and achievements

1. This centre has evaluated the S-1 generation of native chicken germplasm up to 40 weeks of age.
2. Egg production of native chickens up to 40 weeks of age was 72.08 eggs with average egg weight of 41.77 g at 40 weeks of age.
3. Regeneration and evaluation of pedigreed population up to 32 weeks of age was carried out in S-2 generation.
4. High fertility (93.99%) and hatchability (98.75 and 90.60% on FES and TES) was observed in native chickens.
5. Hen housed egg production up to 64 weeks of age was maintained at 261.25 in IWP strain in S-29 generation on phenotypic scale.
6. Average genetic response for 64 weeks hen housed egg production was 6.75 and 8.28 eggs respectively in IWN and IWP strains during last five generations (S-25 to S-29).
7. Sample population of IWN and IWP strains evaluated up to 72 weeks of age produced 301.2 and 304.1 eggs on hen housed basis in S-29 generation.
8. The centre has generated highest revenue of Rs. 64.255 lakhs, which was 194.72% of the total expenditure on feed (Rs. 32.998 lakhs).
9. The centre has supplied record number of germplasm (136743) during the year.
2. Egg production up to 40 weeks of age was higher in native chicken (74.1) as compared to RIR (62.6).
3. S-1 generation of native and RIR breed and their F_1 and three way crosses were regenerated and evaluated up to 16 weeks of age.
4. Body weight recorded at 0 d, 4, 8 and 16 weeks of age has improved in S-1 generation both in native and RIR as compared to previous generation.
5. S-13 generation of IWN and IWP strains along with control layer population was evaluated up to 64 weeks of age. Egg production up to 64 weeks of age was higher in IWN (211.05) than IWP (197.87) strain.
6. Egg production up to 72 weeks of age in IWN and IWP strains were 257.9 and 240.5 eggs respectively.
7. Genetic response for egg production up to 64 weeks of age in IWN and IWP strains were 0.43 and 0.776 respectively over last 10 generations.
8. Regeneration of S-14 generation of IWN and IWP strains is being initiated.
9. The centre has also evaluated IWD and IWK strains up to 64 weeks of age in S-5 generation. The S-6 generation of these strains was produced.
10. The centre has generated the revenue of Rs. 26.715 lakhs which was 76.78% of the expenditure on feed cost. This was better compared to previous generation.
11. The centre supplied a total of 39474 number germplasm during the present year.

Short falls

1. High mortality was observed during 17- 40 weeks of age in native chickens of S-1 generation.
2. Egg production up to 72 weeks of age in both IWN and IWP strains was lesser in S-29 generation.
3. Crosses with native chicken were not produced and evaluated.

AAU, Anand

Accomplishments and achievements

1. In this centre S-0 generation of native birds, RIR breed, F_1 cross (IWN X Native) and three way cross (F_1 X RIR) were evaluated for production traits up to 40 weeks of age.
1. Egg production up to 64 weeks of age has decreased by 42.1, 45.73 and 36.65 eggs respectively in IWN, IWP and control population on phenotypic scale in S-13 generation over previous generation.
2. Egg production up to 72 weeks of age in IWN and IWP strains decreased by 36.3 and 34.5 eggs respectively in S-13 generation over preceding generation.
3. Mortality during 17-40 weeks of age exceeded the permitted rate of 1% mortality per month in IWN, IWP and control populations.

4. The centre supplied a total of 39474 number germplasm during the present year that is lesser than previous year (44,337).

KVAFSU, Bengaluru

Accomplishments and achievements

- Bengaluru centre completed purification and initiated performance evaluation of local indigenous chicken.
- The average body weight of local native chicken at day one and 8 week were 30.43 and 477.84g. The feed efficiency at 0-8 week in local native chicken was 3.10.
- During the current year, production traits of PB-1, PB-2 and Control lines were evaluated for S-8, S-21 generation respectively.
- The S-9 and S-22 generations of PB-1 and PB-2, along with control lines were regenerated and evaluated for juvenile traits.
- The percent fertility was above 80% in PB-1 and PB-2.
- The body weight at day old and 5th week of age increased in PB-1.
- The average selection differential improved by 71.88 and 66.82 g in PB-1 and PB-2 as compared to previous generation.
- The average phenotypic and genetic response of body weight at 5 week showed declined trend in PB- as well as PB-2.
- Center also participated in RSPT, 2016 at Gurgaon.
- A total of 1, 52,641 germplasms were supplied to farmers and other stakeholders.
- During the year 2016-17, the center generated revenue of Rs. 41.71 lakhs which is 116.49% of expenditure on feed cost (Rs. 35.81 lakhs).

Short falls

- ✓ Decline phenotypic and genetic trends in 5 week body weight and egg production at 40 week were observed in PB-1 as well as PB-2.
- ✓ Did not record body weight at 52 week
- ✓ Egg production at 40 and 52 week decreased in PB-2.

GADVASU, Ludhiana

Accomplishments and achievements

- Ludhiana Center has initiated evaluation and crossing of native chicken with improved variety of chicken i.e. PB-2.
- The performance of PB-2 (M) x DESI (F) and DESI (M) x PB-2 (F) (reciprocal) were also recorded.
- The FCR at 0-8 week in local native chicken was very high 4.3.
- The centre regenerated S-9 generation of PB-1 and S-41 generation of PB-2 population. Juvenile traits and production traits up to 52 weeks were also evaluated.
- The body weight at 5 weeks of age increased in PB-1 and PB-2 lines as compared to previous generation.
- The effective selection differential increased in PB-1 by 84.59 g but decreased in PB-2 by 6.91 g as compared to previous generation.
- The feed efficiency up to 5 weeks of age improved in PB-1, PB-2 lines.
- The age at sexual maturity increased in PB-1, PB-2 and Control lines as compared to previous generation.
- The phenotypic and genetic response over last 9 generations for 5 week body weight has shown constant declining trend.
- Centre supplied 57,950 germplasms to the farmers.
- During the year 2016-17, the center generated a revenue of Rs. 15.66 lakhs which is 94.32% of expenditure on feed (Rs. 16.60 lakhs).

Short falls

- ✓ Mortality although decreased in the current year as compared to last year still it is high across different age groups.
- ✓ Need to implement feed restriction regime to keep body at 20 week at optimum prescribed level.
- ✓ PB-1 number of dams used for mating is not as per technical programme.

CARI, Izatnagar

Accomplishments and achievements

- CARI center has completed purification of local native chicken germplasm.

- Juvenile traits of S-15 generation and production traits of S-14 generation in CSFL and CSML were recorded.
- A random bred control was also maintained for estimation of environmental deviations.
- The body at 5 week increased in CSML and CSFL as compared to previous generation.
- The average effective selection differential decreased over the last generation in CSML and CSFL.
- The intensity of selection increased in CSML as well as CSFL as compared to previous generation.
- The average ASM of CSML and CSFL decreased in the current generation as compared to last generation.
- The phenotypic and genetic responses of primary traits have shown constant increasing trend in CSML and CSFL.
- The Center participated 46th RSPPT at Gurgaon result is awaited.
- The phenotypic response of primary traits in CSML and CSFL over four generations were 111.8 and 68.35g, respectively. The genetic response in respective lines was 94.64 and 51.18g.
- ASM of current generation in CSFL (182) and CSML (184) was lesser as compared to previous generation (S-3).
- Center supplied a total of 51,783 germplasm to the farmers.
- During the year 2016-17, the center generated revenue of Rs. 14.00 lakhs which is 72.87% of expenditure on feed (Rs. 19.21 lakhs).

Short falls

- ✓ Number of dams used for mating is not as per technical programme.
- ✓ Average Selection Differential decreased in CSML and CSFL compared to last generation.
- ✓ Did not report adult body weight, ASM and EP52 in Control line.

Short falls

- ✓ Average Selection Differential decreased in CSML and CSFL compared to last generation.
- ✓ Mortality in grower is high in CSML and CSFL.
- ✓ Number of dams used for mating is not as per technical programme.
- ✓ Hatchability is below 80%.

OUAT, Bhubaneswar

Accomplishments and achievements

- Bhubaneswar centre has completed purification and initiated evaluation of S-1 generation of native local chicken.
- The FCR in native was very high (4.2). The egg production up to 40 week in S-0 generation was 14.27.
- During the period S-5 generation of CSFL and CSML were raised and evaluated for juvenile traits. S-4 generation of CSFL and CSML lines were evaluated for production traits.
- In the current year the body weight at 5 weeks remained static in CSFL and CSML.
- FCR up to 5 weeks of age decreased across three lines in the current generation as compared to previous generation.

ICAR Research Complex, Agartala

Accomplishments and achievements

1. During the present year, Tripura centre evaluated Tripura black, *Dahlem Red*, broiler dam line line up to 20 weeks of age. Three way cross was evaluated from 52-72 weeks during E-1 and E-2 was evaluated up to 20 weeks of age.
2. The percent fertility ranged from 54.41 to 85.87%. The fertility improved in all the populations as compared to previous generation except in BN and BND crosses.
3. The hatchability on total eggs set (45.95 to 64.97%) and hatchability on fertile egg set (68.58 to 84.46%) improved in all the lines as compared to previous generation.
4. The body weight at 8 weeks was 316.44, 544.24, 1044.80 and 550.18 g in Tripura Black, *Dahlem Red*, coloured broiler dam line and BN cross, respectively.
5. The 20 week body weight was 1105.68, 1720.28, 3240 and 1590 g in Tripura Black, *Dahlem Red*, coloured broiler dam line and BN cross, respectively.
6. During E-1 evaluation the 72 week egg production was 121.56 and 98.72 eggs under farm and field conditions, respectively, in BND cross. During E-2, body weight at 8 weeks was 565.04 and 503.00g under farm and field conditions respectively.

7. During the year, the germplasm supply was 14,023 chicks. The centre realized overall receipt of Rs. 7.98 lakhs which was 33.02% of the expenditure on feed cost.

Short falls

1. The centre need to hatch 1500 chicks in Tripura black population.
2. Centre should not take the crosses that are not there in technical programme.
3. The centre as to speed process of development of location specific variety.
4. Mortality is high during growing and laying periods.
5. Germ plasm supply and revenue generation is low.

NDVSU, Jabalpur

Accomplishments and achievements

1. Jabalpur centre evaluated G-7 generation of Kadaknath and Jabalpur colour populations up to 52 weeks of age. *Narmadanidhi* birds were evaluated in farm and field up to 52 weeks of age.
2. The fertility remained above 80% in all the populations.
3. During G-7 generation, the 6 week body weight was 381 and 864g in *Kadaknath* and Jabalpur populations.
4. In Jabalpur colour, the egg weight at 40 weeks of age was 59.20 g, and in *Kadaknath*, it was 47.60 g, respectively.
5. The hen housed egg production up to 40 weeks of age was 86.80 eggs in JBL population and 50.30 eggs in *Kadaknath* population.
6. *Narmadanidhi*, dual type chicken having 25% Kd: 75% JBP colour inheritance was evaluated under farm and field conditions. This variety produced 69 and 127 eggs up to 40 and 52 weeks at farm. This cross produced 43, 87 and 171 eggs, respectively, up to 40, 52 and 72 weeks in field conditions.
7. The germplasm supplied during the year was 69,407. The center realized overall receipt of Rs. 22.66 lakhs which was 76.14% of the expenditure on feed.

Short falls

1. Mortality was on higher side at all ages.
2. Revenue generation needs improvement.

AAU, Guwahati

Accomplishments and achievements

1. Guwahati centre evaluated native, *Dahlem Red*, PB-2 and BN populations up to 52 weeks of age. *Kamrupa* [(PB-2 x Indigenous) x *Dahlem Red*] was also evaluated up to 52 weeks of age under farm and field conditions.
2. The fertility remained above 76% in all the populations. The mortality during brooding and growing period was below 3.42% in all the lines. The mortality during laying period was less than 1%.
3. The 5 week body weight was 118.12 g in indigenous, 1065.39g in PB-2 and 365.17g in *Dahlem Red*. The ASM was lowest in *Dahlem Red* (160 days) and highest in indigenous (178 days).
4. In native population the egg weight and egg production up to 52 weeks was 39.85 g and 64.90 eggs, respectively. In *Dahlem Red* egg production improved by 1 egg.
5. The hen housed egg production up to 52 weeks was 70.16 eggs in BN cross.
6. The *Kamrupa* variety was evaluated up to 52 weeks in farm and field conditions. The age at sexual maturity was 150.65 days in the farm and 172.90 days in the field.
7. The hen housed egg production upto 40 and 52 weeks of age was 47.10 and 87.60 eggs in the farm and corresponding values in the field were 42.10 and 71.60 eggs, respectively. The performance of cross was constant over last two generations.
8. The centre supplied 25,021 germplasm to farmers. The center realized receipt of Rs. 4.27 lakhs during the financial year.

Short falls

1. Fertility and hatchability was low.
2. Germplasm supply was low.
3. Revenue generation was very low.

BAU, Ranchi

Accomplishments and achievements

1. Ranchi centre released *Jharsim*, a dual type chicken variety during the current year.
2. The centre evaluated G-5 generation of native population upto 60 weeks of age. In *Dahlem Red* (G-4) was evaluated from 20-60 weeks of age and G-5 generation was evaluated up to 16 weeks.

- The fertility ranged from 82.37 to 95.32% in all the lines during current year. The fertility improved marginally in all the lines as compared to previous generation. The hatchability on total eggs set ranged from 65.14 to 78.19% and it improved marginally in all the populations.
- The hen housed egg production up to 64 weeks was 67.78 eggs in native population during G-5 and it improved by 6.97 eggs compared to previous generation.
- In *Dahlem Red*, the hen housed egg production up to 64 weeks was 115.62 eggs in G-4 generation. In BN cross (E-4) hen housed egg production up to 64 weeks of age was 87.51 eggs.
- In three way crosses, 4, 8 and 20 week body weights were better in DNB cross during E-5 evaluation.
- The hen day egg production up to 64 weeks of age was more in DNB cross (101.42 eggs) than BND cross (93.17 eggs) during E-5 evaluation under farm conditions.
- Centre supplied 15,103 germplasm to the farmers. The center realized a receipt of Rs. 8.90 lakhs during the financial year which is 50.28% of expenditure on feed cost.
- The fertility was good and ranged from 81.33 to 87.22% in all the populations except in *Dahlem Red* population (61.41%) and hatchability needs improvement.
- The 4 week body weight was 257.35, 189.04 and 223.20 g in *Dahlem Red*, native, and DRxN populations, respectively. The egg weight was 53.72, 45.46 and 50.20g, respectively, in *Dahlem Red*, native and DRxN population at 40 weeks. The egg weight reduced in *Dahlem Red* and DRxN cross as compared to previous generation.
- The hen housed egg production in *Dahlem Red* was 67.93 eggs up to 40 weeks of age whereas native population recorded 40.10 eggs. The hen housed egg production upto 52 weeks of age was 103.90, 60.62 and 106.17 eggs in *Dahlem Red*, native and DRxN populations, respectively. The 52 week egg production showed improvement in *Dahlem Red* Population.
- The DNxD cross was evaluated under farm and field conditions up to 40 weeks of age. The egg weight at farm was 53.30 and in field condition was 52.62g. The hen housed egg production in DNxD cross was 65.74 eggs in farm and 39.54 eggs in field conditions up to 40 weeks. This cross produced 148.54eggs upto 72 weeks of age and showed improvement of 12.96 egg at farm compared to previous generation.
- The centre supplied 36,599 chicks of various crosses to farmers. The center realized receipt of Rs. 12.64 lakhs during the financial year which is 73.37% of expenditure on feed cost.

Short falls

- Centre need to hatch more number of chicks in native population.
- The centre should not test BND cross.
- Jharsim* may be evaluated in field also.
- Mortality was on higher side at all ages.
- Germplasm supply was low and reduced compared to previous year. The revenue generation was low.

CSKHPKVV, Palampur

Accomplishments and achievements

- Palampur centre has evaluated the DND cross under farm and field conditions satisfactorily and it is ready to be released for the benefit of farmers of Himachal Pradesh.
- The native germplasm was evaluated up to 52 weeks in G-4 generation. The *Dahlem Red* population evaluated (G-4) upto 52 weeks and G-3 generation was evaluated from 52-72 weeks of age. The G-5 generation of *Dahlem Red* was reproduced. The *Dahlem Red* X Native cross was produced and evaluated up to 52 weeks of age.

Short falls

- Mortality was very high (3.12- 20.95%).
- Centre need to take all the possible steps to improve fertility and hatchability.
- Germplasm needs further improvement

MPUAT, Udaipur

Accomplishments and achievements

- Udaipur centre evaluated G-6 generation of *Mewari* breed up to 52 weeks of age and G-7 generation was reproduced. *Pratapdhan* (BNR cross) was evaluated up to 72 weeks during E-5 and up to 20 weeks in E-6.
- The fertility ranged from 72.73- 87.85% in all the populations and hatchability needs improvement.

3. In *Mewari* population the juvenile body weights at 8 weeks (633g) marginally reduced during G-6 generation (651g) as compared to G-5 generation.
4. The pullets matured 3.11 days early as compared to previous (G-5) generation.
5. The hen housed and hen day egg production upto 52 weeks was 38.88 and 65.07 eggs, respectively, in S-6 generation. During S-5 generation, hen housed and hen day egg production was 54.92 and 92.92 eggs, respectively, up to 72 weeks of age.
6. In *Pratapdhan* the age sexual maturity was 144.54 days during E-5 and 157.61 days during E-6. In E-5, the hen housed and hen day egg production was 96.29 and 170.89 eggs up to 72 weeks of age. The hen housed and hen day egg production up to 72 weeks has improved in E-5 as compared to E-4 evaluation.
7. A total of 78,225 germplasm was supplied during the current year. The center realized a receipt of Rs. 20.69 lakhs during the current financial year which is 77.46% of expenditure on feed cost.

Short falls

1. Mortality was on higher side (3.55-13.86%).
2. Hatchability needs improvement.

Poultry Seed Project

History

India is an agri-based country with more than 65% population living in rural areas, who mainly depends on agriculture and livestock farming for their livelihood. The intensive poultry farming largely depends on expensive inputs like feed ingredients, healthcare products, power and manpower and has grown to an agri-based industry providing employment to 5-6 million people. Therefore, the intensive farming is limited to a few urban pockets in our country, which resulted in wide gap in availability of poultry produce (eggs & chicken meat) between urban and rural areas across the country. The poultry products are available relatively at cheaper price in abundance in production centres and at higher price in rural areas which resulted in wide gap in per capita consumption between urban and rural areas. Logically, there is a great need for protein rich food in the diets of rural population. Majority of rural families in our country consume rice or wheat as staple food, which is rich in energy and low in protein. Therefore, there is a great need for balanced protein for rural population to safeguard their health. Egg and chicken meat are less expensive and can be made readily available to enrich the low protein diets of rural / tribal population by adapting rural poultry farming.

Directorate of Poultry Research has developed three promising chicken varieties, *Vanaraja*, *Gramapriya* and *Srinidhi* which are popular for their better growth and production than the native chicken in the rural and tribal areas. All these birds gained wider acceptability in almost all states of the country. Due to the limited facilities available with the Directorate for supply of these chicken varieties across the country and also difficulties involved in transportation of chicks and fertile eggs throughout the country, necessity was felt to establish rural chicken germplasm multiplication units across the country.

Indian Council of Agricultural Research initiated the Poultry Seed Project with a sole aim to provide the improved chicken varieties to all parts of the country through collaborative efforts involving state agricultural/veterinary universities, line departments and ICAR institutes. Six centres were sanctioned in XI plan and further strengthened in XII plan by adding another five centres, besides; one non funded centre.

Objectives

- Production of around 0.3-1.0 lakh improved poultry seed per identified centre/state per annum to distribute them in respective areas.
- Capacity building in SAUs/ICAR Institutes to produce poultry seed at each centre on its own.

Centres

Considering the advantages of establishing seed (fertile eggs / chicken) multiplication units, the Indian Council of Agricultural Research has initiated and sanctioned "Poultry Seed Project" during the XI five year plan. Initially six centres were sanctioned, three in the NE region and three in the main land and further strengthened with five more centres during XII plan as indicated below (Table 1). One non funded centre has also started during the XII plan.

Table 1. Centres in operation under Poultry Seed Project

S. No.	Centre	State
1	West Bengal University of Animal and Fishery Sciences, Kolkata	West Bengal
2	Bihar Agricultural University, Patna	Bihar
3	Chhattisgarh Kamadhenu Viswa Vidyalaya, Durg	Chhattisgarh
4	Regional Centre, ICAR Research complex for NEH Region, Jharnapani	Nagaland
5	ICAR-National Organic Farming Research Institute, Gangtok	Sikkim
6	Regional Centre, ICAR Research complex for NEH Region, Imphal	Manipur
7	Tamil Nadu Veterinary and Animal Sciences University, Hosur	Tamil Nadu
8	ICAR-Central Coastal Agricultural Research Institute, Panji, Goa	Goa
9	ICAR-Central Island Agricultural Research Institute, Port Blair	A & N Islands
10	IVRI Regional Station, Mukteswar	Uttarakhand
11	Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar	Jammu & Kashmir
12*	ICAR Research Complex for NEH Region, Umiam, Barapani	Meghalaya

*Non funded Centre

Table 2. Budget sanctioned and expenditure at different Centres (Rs. lakhs)

Seed centre	XII plan EFC	2016-17 (EFC)	Budget released	Actual expenditure	Receipt if any,
West Bengal University of Animal and Fishery Sciences, Kolkata	269.89	40.27	42.00		7.5
Bihar Agricultural University, Patna	242.81	39.75	38.00		10.6
Chhattisgarh Kamadhenu Viswa Vidyalaya, Raipur	109.40	23.99	30.50		8.85
Regional Centre ICAR Research complex, Jharnapani,	227.95	39.32	67.00		36.61
ICAR-National Organic Farming Research Institute, Gangtok	146.86	27.93	56.80		32.87
Regional Centre ICAR Research complex, Imphal	234.49	39.75	61.00		20.26
Tamil Nadu Veterinary and Animal Sciences University, Hosur	203.57	26.38	78.75		23.77
ICAR-Central Coastal Agricultural Research Institute, Panji, Goa	203.57	26.38	56.50		
ICAR-Central Island Agricultural Research Institute, Port Blair	190.68	29.13	61.50		0.33
IVRI Regional Station, Mukteswar	173.70	20.16	0.50		--
Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar	155.07	19.75	31.25		--
Total	2158.00	332.74	523.80		140.79

Budget allocation

The council has sanctioned Rs. 2158 lakhs, under XII plan for poultry seed project which includes non-recurring and recurring expenditure required for implementing the project. Budget allocation for each center is given below for the year 2016-17 along with revenue receipts.

Technical Program

- Technical program envisaged for all the centres is same except for the target of supplying chicks/fertile eggs.
- All the centres will procure parents (male line male and female line female) of improved chicken germplasm (*Vanaraja*, *Gramapriya* and *Srinidhi*) from the ICAR-Directorate of Poultry Research. Day old parent chicks will be reared under standard management practices as per guidelines provided in the breeder manual supplied by the Directorate at the respective centre.
- Adult male and females birds will be reared to produce fertile hatching eggs. Day old chicks of the improved germplasm will be hatched and will be reared in the nursery unit or sold to NGOs/ KVKs/farmers for nursery rearing up to 6 weeks of age. The chicks in the nursery unit will be provided with feed, medication, vaccination, brooding, and health care. After the nursery phase, the chicks will be distributed to the individual farmers on cost basis. Wherever possible, the day old chicks / fertile eggs of improved chicken varieties may be distributed to the individual farmers / extension agency / NGO

/ KVK, who has the facility to grow the birds up to 6 weeks of age in the nursery unit. These birds may be further distributed to the individual farmers at the rate of 10-15 birds per person.

- To know the performance of the birds at farmer's field recording of body weight at 4 weeks intervals during growing (7-20 weeks). Egg production and egg weight at every 14 day intervals during egg laying period (21-72 weeks) will be recorded.
- Analysis, documentation and reporting of the data at regular intervals

Table 3. Targets for germplasm supply for different Centres

S. No.	Centre	Target (nos.)
1	West Bengal University of Animal and Fishery Sciences, Kolkata	1,00,000
2	Bihar Agricultural University, Patna	50,000
3	Chhattisgarh Kamadhenu Viswa Vidyalaya, Raipur	40,000
4	Regional Centre, ICAR Research complex for NEH Region, Jharnapani,	70,000
5	ICAR-National Organic Farming Research Institute, Gangtok	40,000
6	Regional Centre, ICAR Research complex for NEH Region, Imphal	60,000
7	Tamil Nadu Veterinary and Animal Sciences University, Hosur	1,00,000
8	ICAR-Central Coastal Agricultural Research Institute, Panji, Goa	50,000
9	ICAR-Central Island Agricultural Research Institute, Port Blair	50,000
10	ICAR-IVRI Regional Station, Mukteswar	30,000
11	Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar	50,000

West Bengal University of Animal & Fishery Sciences, Kolkata

Activity assigned

- Maintenance of parent stock for continuous supply of fertile eggs, day old and grown up chicks of rural chicken varieties.
- Recording the growth, production, fertility and hatchability in parents.
- Collection of data on growth and production parameters from farmer's fields.
- Analysis, documentation and reporting of the data.

Work done

Parent stock

Nine batches of *Vanaraja* parents were reared during the year out of which, 4 are in laying and 2 are in growing phase at Kolkata centre. A total of 1135 female parents and 229 male parent of *Vanaraja* are in position at present. The chicks were fed *ad libitum* till 6 weeks of age with balanced diet, thereafter feed restriction schedule was followed as per the breeder manual to maintain the body weight during the laying period.

Egg production

The average hen day egg production (HDEP) ranged from 25.03 (55-84 weeks) to 46.38% (24-63 weeks) in *Vanaraja* parents (Table 4) in different batches at various age groups. The egg production was low in all the batches. The peak egg production could not cross 55% across all the batches indicating the major management problem. Peak production should be attained at 35-40 weeks of age and continue for a period of 16-20 weeks of age (last year 70% production was recorded at 36-37 weeks of age in *Vanaraja*). The reduction in performance might be due to the poor feed quality and management practices followed like lighting period. It is advised check the lighting schedule and feed quality to improve the egg production. The egg weights ranged from 44.65

(24-68 weeks) to 48.41 (55-84) g in different cycles depending on the age of the birds (Table 4).

Hatching performance

The fertility rate ranged from 83.96 to 87.87% across the batches. The average hatchability on total egg set (TES) and fertile egg set (FES) ranged from 72 to 77 and 85 to 87%, respectively in *Vanaraja* female parents (Table 4). The fertility and hatchability rates were in the optimum range indicating the good hatchery practices.

Germplasm supply

A total of 63554 chicks of *Vanaraja* were distributed to farmers in various parts of West Bengal and adjoining north eastern states with an amount of Rs. 7.50 lakhs revenue during the year 2016-17.

Opportunities and experiences of *Vanaraja* farming in West Bengal

Vanaraja as a component of Integrated Farming under Coastal Agriculture

Coastal agriculture is facing newer challenge with impending climate change. Incidences of storm-Aila like calamities are increasing. Inundation of soil by saline water makes it barren up to 6 to 7 years leaving farmers in dire state. They had to depend heavily on livestock production and marine fish capture for their livelihood. In such situation poultry is an attractive alternative because of shorter gestation period and advantage of piecemeal marketing in local areas many a time on S.O.S basis. Massive efforts have been launched to incorporate poultry farming with *Vanaraja* under diverse farming systems at Sandeshkhali, Gosaba, Bali and adjoining islands. Several institutions like ICAR-Central Institute of Freshwater Aquaculture, Bidhan Chandra Krishi Viswavidyalaya, Rangabelia Tagore Society (an NGO) in association with Poultry Seed Project are actively involved in incorporating *Vanaraja* in specialized

Table 4. Egg production, egg weight and hatchability of *Vanaraja* parents in different cycles

Batch	Age, wks	Egg production, % (HD)	Egg weight, g	Fertility, %	Hatchability, %	
					TES	FES
I	55-84	25.03	48.41	83.96	71.75	85.42
II	42-89	30.07	48.19	84.68	72.20	85.29
III	24-68	46.37	44.65	87.87	77.04	87.46
IV	24-63	46.38	47.16	86.96	75.68	86.91

backyard farming, integration with fishery, rice, vegetables (potato, chili etc.), sunflower, fruit crops (coconut, mango), azzola and as component of diversified farming with dairy and goatary.

Specialized backyard farming with *Vanaraja*

Rangabelia Tagore Society (an NGO) spearheaded distribution of 4437 *Vanaraja* chicks to 200 families of Rangabelia, Jotirampur, Arampur and Pakhirala of Gosaba block. Rearing of the bird was done under direct supervision of Field Staff of the Society. Flocks were maintained by the ladies of the household. The units were integrated with the family chores. Mortality was negligible (2-3%). Keepers maintained the birds in cages or within a small enclosure. They prefer to raise the birds as layer.

Poultry-cum-fishery integrated farming with *Vanaraja*

ICAR-Central Institute of Freshwater Aquaculture under Poultry-cum-Fishery Integrated farming distributed 2698 *Vanaraja* chicks to 88 households having a piece of water body at Chunakhali of

Sandeshkhali-II block. The birds gained 307 gm body weight in 30 days. All the households made arrangement for using poultry droppings in fish farming starting from pond preparation, in brooders pond and grow-out pond. The practice helped in reducing cost on fish feed.

Poultry-cum-agri-horticulture integrated farming with *Vanaraja*

Bidhan Chandra Krishi Viswavidyala made an innovative approach towards strengthening livelihood by Poultry-cum-Agri-Horticulture Integrated farming under coastal agriculture. The project site is located at Bali island of Gosaba block. Numbers of horticultural crop (potato, onion, chili, bitter gourd etc.), fruit crops (mango, jackfruit, coconut etc.), oilseed, paddy were integrated with *Vanaraja* farming. Azola grown on poultry litter was recycled as poultry, cattle and goat feed. Fifty one families were given 2400 *Vanaraja* birds for the purpose. The approach besides boosting crop production contributed in reducing cost on fertilizer.

Bihar Agricultural University, Patna

Activity assigned

- Maintenance of parent stock for continuous supply of fertile eggs, day old and grown up chicks of rural chicken varieties.
- Recording the growth, production, fertility and hatchability in parents.
- Collection of data on growth and production parameters from farmer's fields.
- Analysis, documentation and reporting of the data.

Work done

Parent stock

Three batches (two in laying and one in growing) of *Vanaraja* parents were reared under deep litter system at Patna Centre. The mean body weight in male and female parents at 6 weeks of age was 514.38±8.92 and 449.78±7.56 g in *Vanaraja*, respectively (Table 5). The 20 week body weight was 2770.6±51.23 and 1767.74±46.56 g in *Vanaraja* male and female parents, respectively. The body weight is higher in male line and lower in female line parents compared to the standard body weight of the parents at 20 weeks of age. Proper monitoring of feed restriction is required for maintaining the body weight at standard level for optimum production during laying stage.

Table 5. Body weight, g in *Vanaraja* male and female parents

Age, wks	Male line	Female line
4	285.08±6.52	236.84±5.72
6	514.38±8.92	449.78±7.56
12	1553.52±25.92	1142.4±26.27
16	2080.66±43.64	1273.6±38.72
20	2770.6±51.23	1767.74±46.56
40	3428.6±62.72	2573.08±60.18

Egg production

The age at sexual maturity was 167 days in *Vanaraja* parents. The HDEP in *Vanaraja* at 40 weeks of age was 52.57% with an egg weight of 52.24 g in Batch I and 51.72% with an egg weight of 52.70 in Batch II (Table 5). Peak production of 56.48% attained at 36 weeks of age and maintained between 40-50% till 53rd week of age in batch I. In batch II the production maintained around 50% from 30 weeks onwards with a peak

production of 71% at 42 weeks of age.

Table 5. Egg production and egg weight in *Vanaraja* parents (% on hen day basis)

Age, wks	Egg production, %		Egg weight, g	
	Batch I	Batch II	Batch I	Batch II
28	--	20.27	--	46.64
36	56.48	51.35	51.76	56.88
40	52.57	51.72	52.24	57.70
52	48.20		52.32	
64	19.13		56.16	
72	32.36		57.38	
80	45.20		60.98	

Fertility and hatchability

The average fertility percentage was 86.78 in *Vanaraja* parents. The average TES and FES were 72.68% and 84.52%, respectively in *Vanaraja* female line (Table 6).

Table 6. Fertility and hatchability in *Vanaraja* parents

Age, wks	Fertility, %	Hatchability, %	
		TES	FES
36	73.86	54.90	74.32
40	64.74	47.12	72.78
52	88.99	78.37	88.08
64	83.76	66.35	79.21
72	89.62	82.45	92.0
Overall	86.78	72.68	84.52

Germplasm supply

A total of 55, 329 improved chicken germplasm were distributed during the year 2016-17 (Table 7). Farmers preferred grown up chicks rather than day old chicks in Bihar. During this year 55% of chicks were distributed in the form of day old chicks which is an encouraging sign for rural poultry farming in the state. The backyard poultry activity was propagated effectively involving various agencies like ATMA and KVKs. An amount of Rs. 10.60 lakhs revenue was generated at Patna centre. The centre has achieved the target for the first time since inception of the Centre.

Feedback from the beneficiaries

The farmers reared the *Vanaraja* birds under free range conditions. The farmers expressed satisfaction on the performance of the birds under backyard system of rearing.

Constraints and difficulties, if any

- High growing period mortality especially in winter season
- Less demand for chicks during winter season
- High feed cost

Table 7. Germplasm and revenue generation at Patna

Month	Germplasm	Revenue (Rs.)
April 2016	2733	21569
May	2441	72843
June	3804	96712
July	7040	119210
August	2863	24496
September	7908	152778
October	5167	82734
November	4784	17330
December	2337	113411
January 2017	829	14363
February	6878	147948
March	8545	196196
Total	55329	1059680

Chhattisgarh Kamadhenu Krishi Viswa Vidyalaya, Durg

Activity assigned

- Maintenance of parent stock for continuous supply of fertile eggs, day old and grown up chicks of rural chicken varieties.
- Recording the growth, production, fertility and hatchability in parents.
- Collection of data on growth and production parameters from farmer's fields.
- Analysis, documentation and reporting of the data.

Work done

Parent stock

Two batches of *Vanaraja* parents were in laying stage and one batch was in growing stage at Durg during the reporting period. The body weight of *Vanaraja* male and female parents at 6 weeks of age was 642.5g and 465.2 g. The 20 week body weight in male and female lines was 1654.6 and 1125.5 g, respectively. The body weight in parent lines was low as per the standard target body weight. The target body weight needs to be maintained by monitoring the feeding schedule to get the optimum production during the laying phase.

Egg production

The ASM in *Vanaraja* female line was 161 days. The average hen HDEP was 46.8% in *Vanaraja* during 24-56 weeks of age (Table 8). The peak egg production of 68% was attained at 36 weeks of age and continued till 56 weeks of age. The egg production was optimum in batch II of *Vanaraja* parents with fluctuations during some weeks.

Table 8. Egg production (HDEP%) in *Vanaraja* parents

Age, wks	Batch I	Batch II
28	-	39.9
36	-	68.3
40	-	68.4
52	43.4	46.5
64	31.5	-
72	33.9	-
Average	34.7 (48-74 wks)	46.8 (24-56 wks)

Hatching performance

The average fertility was 79.53%. The hatchability on TES and FES in *Vanaraja* female parents was 81.31 and 90.68%, respectively (Table 9).

Table 9. Fertility and hatchability in *Vanaraja* parents

Age, wks	Fertility, %	Hatchability, %	
		TES	FES
28	95.27	91.28	95.81
40	95.83	85.61	96.17
52	94.98	91.08	95.89
64	90.13	77.89	86.42
72	76.28	49.06	64.31
Overall	79.53	88.31	90.68

Germplasm supply

A total of 31, 224 improved chicken germplasm of *Vanaraja* were distributed to 224 farmers covering 85 villages across Chhattisgarh. An amount of Rs. 8.86 lakhs revenue was generated from the Centre.

Feedback

The field data on body weights was collected. The body weight at 12 weeks of age was 1.2-1.3 g in *Vanaraja* birds under field conditions.

Constraints

1. Only one setter is available at the Centre. One more setter is required immediately.
2. No feed store at the centre.

Regional Centre of ICAR Research Complex Jharnapani, Nagaland

Activity assigned

- Maintenance of parent stock for continuous supply of fertile eggs, day old and grown up chicks of rural chicken varieties.
- Recording the growth, production, fertility and hatchability in parents.
- Collection of data on growth and production parameters from farmer's fields.
- Analysis, documentation and reporting of the data.

Work done

Parent stock

Five batches (3 *Vanaraja* and 2 *Srinidhi*) of parents were reared at Jharnapani during the reporting period of which two batches of *Vanaraja* and one batch of *Srinidhi* were in laying phase. A total of 2426 parents of *Vanaraja* and *Srinidhi* were in position at present. The body weight at 20 weeks of age was 2218.6±92.43 and 1613.16±37.53g in *Vanaraja* female parents, while 3382.25±86.40 and 1314.53±28.71 in *Srinidhi* parents (Table 10). The body weight in male lines of both *Vanaraja* and *Srinidhi* was higher, which needs to be maintained by following proper feed restriction schedule to maintain the target body weight for optimum reproductive performance. In case of female lines, the body weight was marginally lower.

Egg production

The HDEP in *Vanaraja* and *Srinidhi* parents at different weeks are presented in Table 11. The production of 50% was attained at 36 weeks of age and maintained till reporting date i.e., 46 weeks of age in both *Vanaraja* and *Srinidhi* parents. The egg production was consistent in both *Vanaraja* and *Srinidhi* parents. However, in other batches some fluctuations were observed. In, *Vanaraja* female line the egg production

maintained at later stages also with 42% production at 72 weeks of age. The peak production of 69% was observed at 50 weeks in *Vanaraja* and 72% at 43 weeks of age in *Srinidhi*.

Table 11. Egg production (HDEP) in parents of *Vanaraja* and *Srinidhi*

Age, Week	<i>Vanaraja</i>		<i>Srinidhi</i>	
	Batch	HDEP%	Batch	HDEP%
28	III	17.16	II	7.37
36	III	49.73	II	53.09
40	III	62.49	II	54.86
64	I	37.30	I	38.96
72	I	42.96	I	32.73

Hatching performances

The fertility varied from 86 to 93% in *Vanaraja* and 73 to 93% in *Srinidhi* female lines (Table 12). The hatchability on fertile eggs set varied between 81-82% in *Vanaraja* and 68-82%, respectively in *Srinidhi* parents across different batches.

Table 12. Hatching performance of *Vanaraja* and *Srinidhi* parents

Batch	<i>Vanaraja</i>			<i>Srinidhi</i>		
	Fertility, %	Hatchability, %		Fertility %	Hatchability, %	
		TES	FES		TES	FES
I	85.61	61.22	81.29	73.20	50.20	67.65
II	90.85	73.89	81.29	92.97	77.39	82.41
III	92.60	76.93	82.99			

Germplasm supply

A total of 81729 improved chicken germplasm was distributed to farmers of Nagaland and neighbouring states during the year (Table 13). The germplasm supply was highest since the inception of the project and covered around 1350 beneficiaries across the state of Nagaland and other NEH states. A total of 36.61 lakh revenue was generated under

Table 10. Body weights (g) in *Vanaraja* and *Srinidhi* parent lines

Age, week	<i>Vanaraja</i>		<i>Srinidhi</i>	
	Male line	Female line	Male line	Female line
4	417.55±5.42	305.34±5.10	672.5±19.15	207.9±4.65
6	830.4±13.22	499.5±12.05	875.6±32.18	303.16±6.31
12	1749.05±31.55	1137.93±21.25	1581.45±70.39	742.9±18.67
16	1904.75±35.97	1363.16±28.88	2440.3±95.96	1056.1±21.25
20	2218.6±92.43	1613.16±37.53	3382.25±86.40	1314.53±28.71

PSP at Jharnapani Centre. A total of 55573 chicks of *Vanaraja* and *Srinidhi* varieties were provided to 1228 beneficiaries under Tribal Sub Plan (TSP). The centre achieved the set targets and effectively popularized the rural poultry farming in tribal and rural areas of Nagaland and neighbouring states.

Table 13. Germplasm supply and revenue generation

Month	Germplasm	Revenue (Rs.)
April 2016	5025	442715
May	4272	123100
June	6368	197135
July	3270	135060
August	3597	205394
September	1540	139185
October	1612	500160
November	4800	230575
December	7802	333764
January 2017	14866	598698
February	13240	517296
March	15337	658950
Total	81729	3660916

Feedback from farmers

The feedback from the farmers is quite encouraging, the project has become popular in the state and there was huge demand for day old and grown-up chicks from different districts of Nagaland and nearby states like Arunachal Pradesh, Assam, Manipur and Meghalaya. Farmers are coming from far of places like Mon, Tuensang and Longleng for purchasing chicks for rearing for egg purpose as availability of eggs in that area is very less and also costly.

Poultry Seed Project has been successfully meeting the demand of eggs and meat in the remote areas of the country and providing subsidiary source of income and empowering the women in Nagaland.

Constraints

- Irregular power supply throughout the year affecting hatchery operations.
- Only one setter is available at present. One more setter is urgently required

ICAR National Organic Farming Research Institute Gangtok, Sikkim

Activity assigned

- Maintenance of parent stock for continuous supply of fertile eggs, day old and grownup chicks of rural chicken varieties.
- Recording the growth, production, fertility and hatchability in parents.
- Collection of data on growth and production parameters from farmer's fields.
- Analysis, documentation and reporting of the data.

Work done

Parent stock

Two batches (one in laying and one in growing) of *Vanaraja* parents were reared at ICAR-NOFRI, Gangtok, Sikkim during the year 2016-17. The mortality up to 20 weeks of age was 3.5% indicating the better management during growing phase. The body weight of male and female parents of *Vanaraja* at 20 weeks of age was 2470 and 2040 g, respectively (Table 14). The body weights in male line is higher than the standard body weight at 20 weeks of age. However, in female line it is almost equal to standard body weight.

Table 14. Body weight (g) of *Vanaraja* birds up to 20 weeks of age

Age, weeks	No of birds	Body weight, g	
		Female line	Male line
4	647	326.5	394
6	644	567	743
12	636	1285	1405
16	635	1670	2040
20	510	2040	2470

Egg production

The average HDEP in *Vanaraja* was 52.76 (27-64 weeks) with an average egg weight of 58.04 g during the reporting period (Table 15). Peak production (50-67%) was attained at 30 weeks of age and sustained till 58 weeks of age and reduced to 40% at 64 weeks of age. The persistency of production is very good in *Vanaraja* at Gangtok indicating the better management practices followed at the Centre.

Table 15. Egg production in *Vanaraja* parents birds

Age, wks	Egg production, %	Egg weight, g
28	29.76	51.57
36	64.72	56.57
40	58.86	60.00
52	48.91	61.35
64	40.14	60.28
Average (27-64)	52.76	58.01

Hatching performance

The average fertility and hatchability (TES) rates in *Vanaraja* female line were 85.59 and 76.98% respectively. The fertility and hatchability is fairly good indicating ideal hatching conditions.

Germplasm supply

A total of 71109 improved chicken germplasm (*Vanaraja*) was distributed to 2702 farmers covering 626 villages across Sikkim (Table 16). About 94% supply was under various tribal sub projects in addition to PSP tribal sub plan. An amount of Rs. 32.87 lakhs revenue was generated from the centre. The centre achieved the set targets and effectively popularized the backyard poultry farming in tribal and rural areas of Sikkim.

Table 16. Details of chicks distribution in Sikkim

Month	Germplasm	No of Beneficiaries	No of Villages
April 2016	2857	109	34
May	3168	126	41
June	2976	105	36
July	2825	108	53
August	9064	316	66
September	10481	405	70
October	9448	360	59
November	7749	285	85
December	7850	333	38
January 2017	6981	276	70
February	3847	154	39
March	3863	125	35
Total	71109	2702	626

Constraints

No constraints were reported in operating the project.

Regional Centre of ICAR Research Complex Imphal, Manipur

Activity assigned

- Maintenance of parent stock for continuous supply of fertile eggs, day old and grownup chicks of rural chicken varieties.
- Recording the growth, production, fertility and hatchability in parents.
- Collection of data on growth and production parameters from farmer's fields.
- Analysis, documentation and reporting of the data.

Work done

Parent stock

Two batches of *Vanaraja* and two batches of *Srinidhi* parents were reared at Manipur Centre during the year. The body weight at 20 weeks of age in male and female parents of *Vanaraja* and *Srinidhi* was 3142.92 and 2104.11 g and 4005.86 and 1532.08 g, respectively (Table 17). The body weight was higher in both male and female parents, which is not desirable as it effects the egg production and reproductive performance. It clearly shows that the feed restriction schedule was not followed properly. It is suggested to follow the feed restriction strictly as per the breeder manual to maintain the body weight for better egg production during laying phase.

Table 17. Body weight (g) in *Vanaraja* and *Srinidhi* parents

Age, weeks	<i>Vanaraja</i>		<i>Srinidhi</i>	
	Male line	Female line	Male line	Female line
4	521.27	295.84	595.01	247.18
8	1385.73	1056.02	1441.28	614.82
12	1762.51	1194.37	2310.62	892.71
16	2685.49	1684.09	3124.41	1346.13
20	3142.92	2104.11	4005.86	1532.08

Hatching performance

A total of 35639 chicks were produced from 42040 fertile eggs with 85% hatchability.

Germplasm supply

A total 17428 improved rural chicken germplasm was distributed to the farmers in Manipur. The centre has generated Rs. 20.06 lakhs of revenue during the year 2016-17.

Field performance and feedback from the farmers

Field data on growth performance of *Vanaraja* and *Srinidhi* were collected from different places in Manipur (Table 18). The body weight at 20 weeks of age in male and female chicks was 3457.43 and 2128.72 g in *Vanaraja* and 3842.47 and 1473.42 g in *Srinidhi*, respectively. The centre has conducted training/awareness programs in poultry farming to the farmers.

Table 18. Body weight (g) of *Vanaraja* and *Gramapriya* chicks under field conditions

Age, weeks	<i>Vanaraja</i>		<i>Srinidhi</i>	
	Male	Female	Male	Female
4	395.97	374.75	441.02	243.54
8	1327.56	1026.29	1275.62	553.60
12	1584.23	1364.75	1830.40	870.15
16	2016.31	1945.48	2337.00	1277.51
20	3457.43	2128.72	3842.47	1473.42

Constraints

- Due to recent RD outbreak the target could not be achieved.
- Non availability quality feed

Tamil Nadu Veterinary and Animal Sciences University, Hosur

Activity assigned

- Construction of civil works and Procurement of equipments.
- Maintenance of parent stock for continuous supply of fertile eggs, day old and grownup chicks of rural chicken varieties.
- Recording the growth, production, fertility and hatchability in parents.
- Collection of data on growth and production parameters from farmer's fields.
- Analysis, documentation and reporting of the data.

Work done

Civil works and equipments

Civil works are in progress at Hosur. All required poultry equipments have been procured.

Parent stock

Two batches of *Vanaraja* and *Gramapriya* parents were reared at Hosur Centre during the reporting period. The body weight at 20 weeks of age in male and female parents was 2400 ± 110.7 and 1920.0 ± 38.6 g in *Vanaraja* and 2389.0 ± 68.4 and 1461.7 ± 28.5 g in *Gramapriya*, respectively (Table 19). The body weight at 20 weeks age was almost similar to the target body weight in female lines, however it was higher in male lines which needs to be maintained for better reproductive performance of lines.

Table 19. Body weight (g) in *Vanaraja* and *Gramapriya* parents

Age, wks	<i>Vanaraja</i>		<i>Gramapriya</i>	
	Male	Female	Male	Female
4	436.3 ± 12.2	422.9 ± 3.9	432.0 ± 5.8	227.0 ± 1.5
6	812.7 ± 26.1	729.3 ± 18.9	806.7 ± 27.9	413.0 ± 7.5
12	1339.0 ± 23.7	1209.1 ± 24.0	1432.1 ± 59.2	980.1 ± 23.8
16	1920.0 ± 90.2	1533.0 ± 29.0	1760.0 ± 75.4	1270.0 ± 19.3
20	2400 ± 110.7	1920.0 ± 38.6	2389.0 ± 68.4	1461.7 ± 28.5

Egg production

The hen day egg production in both *Vanaraja* and *Gramapriya* is presented in Table 20. The egg production ranged from 53-59 (36-76 weeks) in *Vanaraja* and 63-78% (36-76 weeks) in *Gramapriya*,

respectively. The persistency of production is excellent in both varieties indicating the ideal management practices resulting in optimum productivity from the birds. The egg weight at 40 and 72 weeks was 53.8 and 58.4 g in *Vanaraja* and 56.7 and 62.8 g in *Gramapriya*. The egg production per bird was 206 in *Vanaraja* and 240 in *Gramapriya* at 76 weeks of age.

Table 20. Egg production in *Vanaraja* and *Gramapriya* parents birds

Age	<i>Vanaraja</i>			<i>Gramapriya</i>		
	HDEP, %	Egg weight, g	HDEP/ Bird	HDEP, %	Egg weight, g	HDEP/ Bird
36	70.0	53.3	53	77.9	55.6	61
37	70.2	53.8	57	77.1	56.1	66
38	70.1	53.8	62	77.9	56.3	71
39	66.6	53.8	67	75.2	56.6	76
40	64.8	53.8	71	75.5	56.7	81
41	65.6	53.8	75	74.6	56.7	86
42	66.2	53.8	80	76.2	56.7	91
43	67.9	54.1	84	75.3	56.7	96
44	68.4	54.4	89	75.8	56.7	101
45	67.1	55.2	93	74.9	56.9	106
46	70.5	55.3	98	72.2	56.9	111
47	67.0	55.3	103	72.0	56.9	116
48	65.5	55.3	111	72.3	56.9	121
49	63.6	55.4	115	70.2	57.1	125
50	64.2	55.4	115	67.5	57.1	130
51	62.8	56.6	120	70.4	58.6	134
52	63.4	56.7	124	73.1	59.6	139
53	61.1	57.0	128	70.2	59.8	144
54	62.2	57.1	132	71.0	59.8	148
55	58.9	57.1	136	73.2	60.1	153
56	59.1	57.1	140	71.8	60.1	157
57	58.0	57.1	144	70.6	60.2	162
58	55.7	57.1	147	69.3	60.2	166
59	40.5	57.1	150	68.9	60.2	171
60	49.0	57.1	153	63.4	60.2	175
61	53.9	57.5	157	63.7	60.2	179
62	53.7	57.1	160	66.5	60.4	183
63	54.2	57.5	164	68.0	59.8	187
64	52.0	57.5	167	66.4	60.2	191
65	52.4	57.1	171	68.0	60.0	196
66	52.5	57.5	174	71.6	60.0	200
67	55.1	57.9	178	69.3	59.9	204
68	52.4	58.8	181	66.1	61.4	209
69	53.8	58.3	185	66.2	59.9	213
70	51.5	58.3	188	69.0	62.8	217
71	46.6	58.3	191	65.0	62.6	221
72	46.7	58.4	194	64.3	62.8	225
73	46.9	58.5	197	63.0	62.9	229
74	46.4	58.0	200	65.5	62.8	233
75	45.1	58.6	203	62.9	63.1	237
76	44.5	58.5	206	63.6	63.1	240

Hatching performance

The data on fertility and hatchability of *Vanaraja* and *Gramapriya* female parents are presented in Table 21. The fertility ranged from 79 to 94% in *Vanaraja* and 73-90% in *Gramapriya*, respectively. The hatchability

on total egg set (TES) and fertile egg set was consistent throughout the life cycle reaching up to 90% (TES) in *Vanaraja* and 85% (TES) in *Gramapriya*. The fertility and hatchability is consistently good indicating ideal hatching conditions.

Table 21. Hatching performance in *Vanaraja* and *Gramapriya* parents

Age, wks	<i>Vanaraja</i>				<i>Gramapriya</i>			
	Fertility (%)	Hatchability, %		Chick/ bird	Fertility (%)	Hatchability, %		Chicks/ bird
		TES	FES			TES	FES	
33	92.4	88.0	95.2	26	86.0	79.4	92.3	31
34	91.4	86.6	94.8	29	84.4	77.2	91.5	35
35	91.3	88.0	96.4	32	86.1	81.6	94.8	39
36	92.7	90.0	97.1	36	86.8	82.8	95.4	43
37	91.5	87.6	95.7	40	89.4	84.5	94.5	47
38	90.9	87.7	96.5	43	89.3	84.7	94.9	52
39	90.6	87.0	96.0	47	85.7	80.9	94.4	56
40	91.9	87.8	95.6	50	86.2	80.6	93.5	59
41	91.5	27.6	30.1	51	87.0	80.1	92.1	62
42	91.5	86.2	94.1	54	88.5	82.3	93.0	65
43	93.5	87.9	94.0	57	89.7	83.3	92.8	69
44	91.3	87.6	96.0	59	87.2	80.1	91.8	72
45	92.3	88.8	96.1	62	90.2	84.5	93.6	75
46	91.4	87.5	95.7	64	88.6	82.6	93.2	78
47	92.5	88.3	95.5	68	89.1	82.2	92.2	80
48	92.1	87.8	95.3	69	89.2	82.8	92.9	83
49	93.9	89.0	94.8	71	87.2	79.3	91.0	87
50	90.9	87.0	95.7	74	87.0	79.0	90.7	91
51	91.0	87.3	96.0	77	86.7	80.1	92.4	94
52	91.2	83.4	91.5	79	86.2	76.9	89.2	96
53	93.1	86.0	92.4	82	86.8	77.9	89.8	99
54	93.9	90.1	95.9	84	88.6	83.3	94.1	101
55	92.2	88.4	95.9	86	87.5	82.9	94.7	104
56	89.9	69.7	77.5	88	82.8	69.6	84.1	106
57	89.4	84.9	94.9	91	83.6	78.2	93.5	109
58	91.2	85.5	93.8	93	86.1	79.0	91.7	111
59	89.3	84.2	94.3	95	86.1	78.8	91.5	114
60	86.3	77.6	89.9	97	80.8	71.0	88.0	117
61	88.8	84.0	94.6	100	88.5	77.9	88.0	120
62	90.3	84.0	93.1	103	84.1	74.6	88.7	123
63	87.7	76.4	87.1	105	82.2	71.3	86.7	125
64	79.2	66.6	84.1	107	72.5	50.7	70.0	126
65	92.2	76.5	83.0	109	86.0	70.0	81.4	129
66	87.6	79.3	90.5	111	86.0	74.8	87.0	131
67	88.3	78.0	88.3	113	84.6	73.6	87.0	134
68	79.9	69.5	87.0	115	82.9	69.9	84.4	136
69	83.0	70.7	85.2	117	80.4	62.8	78.1	138
70	88.8	78.9	88.8	119	86.8	72.8	83.9	140
71	88.6	81.0	91.4	121	84.4	73.5	87.1	142
72	90.1	77.7	86.2	124	84.9	67.2	79.2	146
73	85.2	73.0	85.6	126	81.6	64.6	79.1	150

Germplasm supply

A total of 1,15,956 improved rural chicken (*Vanaraja* and *Gramapriya*) germplasm was distributed to 656 farmers in Tamil Nadu. The Centre has generated total revenue of Rs. 23.64 lakhs during the year 2016-17. The centre has achieved the target and effectively disseminated the technologies to end users.

Feedback from farmers

The body weight at 12 weeks of age under field conditions was 1390.00 g in *Vanaraja* and 1013.30 g in *Gramapriya*, respectively (Table 22). The egg production of *Vanaraja* and *Gramapriya* in field condition under semi-intensive system of rearing was started by 21st week of age, whereas, fifty per cent egg production was reached at 25th week of age.

Table 22. Performance of *Vanaraja* and *Gramapriya* under farmer's field

Age, wks	<i>Vanaraja</i>		<i>Gramapriya</i>	
	Body weight, g	Mortality, %	Body weight, g	Mortality, %
1	61.4	1.04	54.77	0.31
2	156.2	0.0	124.0	0.0
3	274.5	0.0	204.1	0.0
4	460.5	0.0	285.2	0.0
5	597.3	0.21	430.7	0.0
6	615.8	0.0	439.6	0.0
7	807.5	0.0	635.0	0.0
8	972.5	0.0	811.7	0.0
9	990.0	0.0	860.0	0.16
10	1178.3	0.0	956.7	0.0
11	1340.0	0.0	986.0	0.0
12	1390.0	0.0	1013.3	0.31

Constraint

- Funds under livestock components are less, needs to be increased

Central Coastal Agricultural Research Institute (CCARI), Goa

Activity assigned

- Construction of civil works
- Procurement of poultry equipments
- Maintenance of parent stock for continuous supply of fertile eggs, day old and grown up chicks of rural chicken varieties.
- Analysis, documentation and reporting of the data.

Work done

Civil works and equipments

The construction of poultry houses and hatchery is in progress. All poultry equipments were procured.

Parent stock

Two batches (one each) *Gramapriya* (504) and *Srinidhi* (504) parents were reared at Goa in the existing facility. The body weight at 20 weeks of age in male and female parents were 2821.67 and 1049.23 g in *Gramapriya* and 2825.78 and 1133.18 g, in *Srinidhi*, respectively (Table 23). The body weight in female parent was low which

affects the productivity at laying. Regular monitoring of feeding, feed quality and management is advised to improve the body weight in female parents. The body weight in male parent is high which needs to be reduced by following proper feed restriction schedule as per the breeder manual.

Table 23. Body weight (g) in *Srinidhi* and *Gramapriya* parents

Age, wks	<i>Srinidhi</i>		<i>Gramapriya</i>	
	Male line	Female line	Male line	Female line
4	213.67	132.04	172.34	116.18
12	1819.07	588.11	1424.23	588.11
16	2343.63	965.21	2018.93	868.53
20	2825.78	1133.18	2821.67	1049.23

Egg production

The egg production started at 22 weeks of age in both varieties. The production attained about 30% at 32 weeks of age. Proper management and quality feed during laying phase will improve the performance of the birds.

Central Island Agricultural Research Institute (CIARI), Port Blair

Activity assigned

- Construction of civil works
- Procurement of poultry equipments
- Maintenance of parent stock for continuous supply of fertile eggs, day old and grown up chicks of rural chicken varieties.
- Analysis, documentation and reporting of the data.

Work done

Civil works and equipments

The construction of poultry houses and hatchery is in progress. Equipment procurement was completed.

Parent stock

One batch each of *Vanaraja* and *Gramapriya* parents were reared under deep litter system during the period. The 20 week body weight in male and female lines was 2819.25 ±40.03 and 1813.4±27.29 g in *Vanaraja* and 2337.1±30.52 and 1504.1±18.42 in *Gramapriya*, respectively (Table 24). The body weight was higher compared to standard body weight in male lines. Proper monitoring of the feed restriction program is needed to maintain the body weights.

Table 24. Body weight (g) in *Vanaraja* and *Gramapriya* parents

Age wks	<i>Vanaraja</i>		<i>Gramapriya</i>	
	Male line	Female line	Male line	Female line
4	292.2±6.99	418.9±10.54	366.7±4.36	301.5±4.17
6	396.5±9.77	497.6±11.03	497.9±16.09	350.6±8.74
20	2819.25 ±40.03	1813.4±27.29	2337.1 ±30.52	1504.1±18.42

Egg production

The age at sexual maturity (ASM) was 168 days in *Vanaraja* female line. The 40 week HDEP was 50% in *Vanaraja* parents and maintained for 6 weeks (46 weeks). The 40 week egg weight was 57 g.

A total of 13842 hatchable eggs were produced from 22 to 46 weeks of age in *Vanaraja*. The age at sexual maturity was 22 weeks. The age at 5% and 50% egg production were 24 and 38 weeks, respectively. The peak egg production reached at 36 weeks and was maintained up to 46 weeks with fluctuations during 42-43 weeks of age. However, the overall egg production was very less and never crossed 40% which needs the attention.

Germplasm supply

A total 1300 *Vanaraja* chicks were distributed in Andaman & Nicobar Islands with revenue of Rs. 32745 during the year.

Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, (SKUAST), Srinagar

Activity assigned

- Construction of civil works
- Procurement of poultry equipments
- Maintenance of parent stock for continuous supply of fertile eggs, day old and grown up chicks of rural chicken varieties.
- Analysis, documentation and reporting of the data.

Work done

Civil works and equipments

The construction of civil works is nearing completion.

Table 25. Adult body weight (g) of Vanraja parent stock

Age, wks	Vanaraja	
	Female line	Male line
4	310.34±6.54	450.22±8.80
6	530.34±8.76	776.12±12.34
12	1134.45±28.30	1456.34±40.42
20	1864.42±16.01	2423.34±57.91
40	2204.54±74.52	2804.54±131.09

Parent stock

One batch of *Vanaraja* breeders were reared during the period. The body weight at 20 weeks of age was

2423.34±57.91 g in male and 1864.42±16.01 g female parents of *Vanaraja* (Table 25).

Egg production

The age at first egg was 181 days. The egg production attained 49% during 37-40 weeks of age. Two batches of eggs were under incubation. In old batch *Vanaraja* birds the egg production was about 10% (69-74 weeks) and hatchability was 33%.

Germplasm supply

A total of 2234 *Vanaraja* chicks were distributed to 90 farmers in four districts of Jammu and Kashmir.

Feedback

Field data was collected under intensive management. The body weight at 4 and 6 months was 1.2 and 2.7 kg in *Vanaraja* birds in Jammu and Kashmir. The body weight at one year in *Vanaraja* was 3.2 kg in female and 4.3 kg in male under farmers backyards. The birds started laying at 6-7 months. 10-20% mortality was observed in field conditions. The Centre conducted many extension programs to popularize the backyard poultry farming in Jammu and Kashmir.

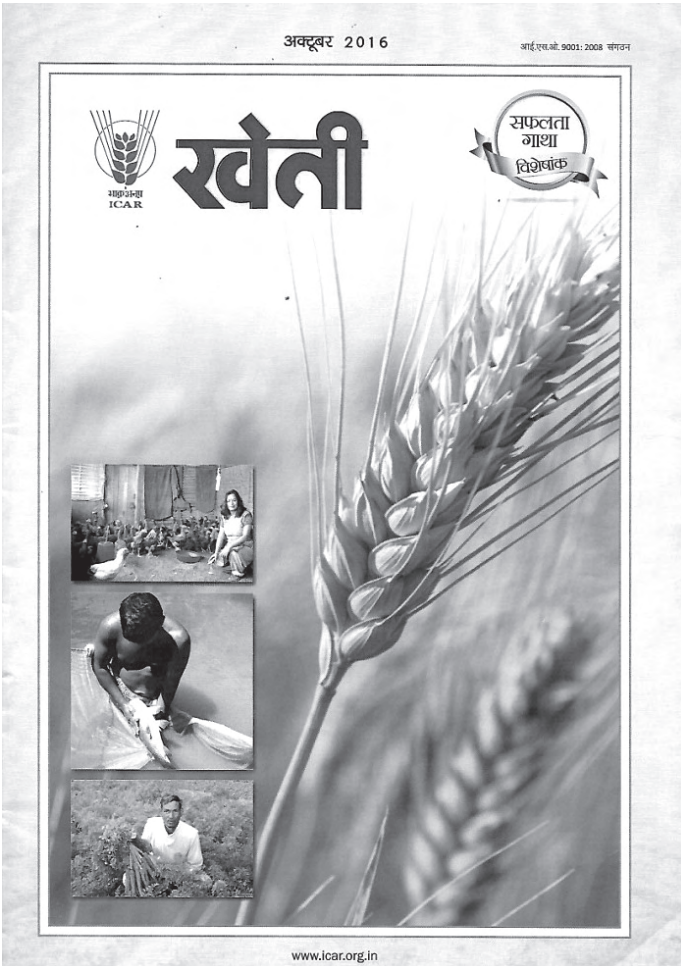
ICAR - Indian Veterinary Research Institute Mukteswar

The works could not be initiated due to administrative and technical difficulties

Success Stories

Mahila Krushak Bani Path Pradarshak, (ICAR- NOFRI Gangtok)

Success story Published in Special Issue of Kheti, October 2016



अक्टूबर 2016

आई.एस.ए. नं. 9001: 2008 संस्करण



खेती

सफलता गाथा
दिशिवांक



www.icar.org.in

HIMALAYAN MIRROR GANGTOK, WEDNESDAY 21 SEPTEMBER

Successful Vanaraja Backyard Poultry farming entrepreneur under intensive condition from South Sikkim

FEATURE

Vanaraja poultry is a dual purpose poultry breed developed by ICAR-NOFRI, Gangtok. Due to its similarity in phenotypic appearance to the Vanaraja birds, it has been well accepted by the farmers of Sikkim. The average egg production is far better than the local poultry breeds. There are some other reasons for the popularity of the birds in Sikkim like attractive small color, feather, low maintenance cost, high disease resistance and large brown coloured eggs resembling the local egg. Further, the birds consume insects and body grubs and plants if they are raised in backyard conditions. Some farmers in Sikkim still grow herbs and grasses to the birds when they are raised in semi-intensive conditions.

The birds are very well accustomed to the climate of Sikkim with good growth and excellent egg production as per the data presented in the report. The poultry has been performing well in all four districts of Sikkim, Eastern, ICAR- Sikkim Cluster and zone ICAR- National Organic Farming Research Institute (NOFRI) located at Takeng, Gangtok established Vanaraja poultry as 20% under the Poultry Seed Project funded by ICAR-DPR, Hyderabad. Since inception, the birds have been produced in all four districts of Sikkim with the technical intervention of ICAR-NOFRI. Vanaraja parent chicks are produced at the Poultry Unit of ICAR-NOFRI, Hyderabad and raised at the Poultry Unit of ICAR-NOFRI for production of female eggs and are sold to the farmers in the region.

Under the Tribal Sub Plan (TSP) component of the Project, the institute has been distributing free of cost Vanaraja day old chicks (DOC) to the tribal districts of Sikkim. During the last financial year, we have supplied 51,687 nos. of DOC to the farmers. Out of this 47,398 nos. of DOC have been applied free of cost to tribal farmers under TSP project. Due to the intervention of ICAR-NOFRI, the rural farmers have been able to improve nutritional and husbandry security through the Vanaraja backyard poultry farming. There is a great demand of Vanaraja eggs in the urban, semi-urban and rural areas.

The price of the egg varies from Rs. 10/- to Rs.20/- as per the size of the egg and the quality of the egg. The birds are performing very well. Within a period of 3 months birds attain 1.7 to 1.8 kg body weight. The start selling the birds at the age of 3 months and all the birds are sold out by 4 months of age. This was the story of Mr. Madhu Thari, lady entrepreneur from Tuni, Tarko, South Sikkim who has been raising the purchased Vanaraja birds for the last two years in a small low cost old house converted into poultry house for rearing of Vanaraja birds. The house is made up of locally available materials like wood, mud, bamboo, roof sheet etc. The house barely accommodates 250 nos. of birds.

The birds are raised by rearing the demand during the chicken rearing period continuously from the Vanaraja backyard poultry farming in the region. The birds are raised by rearing the demand during the chicken rearing period continuously from the Vanaraja backyard poultry farming in the region.

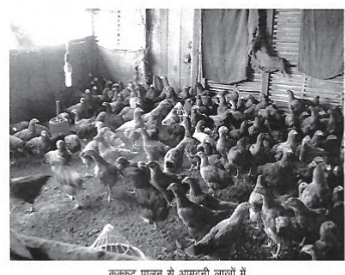


सराहनीय

सफलता गाथा
दिशिवांक

महिला कृषक बर्नी पथ प्रदर्शक

सुश्री मंजू तिवारी पोल्ट्री फार्म में



कुक्कट पालन से आमनी लालों में

“सुश्री मंजू तिवारी एक वर्ष में कुक्कटों को तीन खेप का पालन करती हैं। पालन खर्च व चूड़ों के क्रय लागत को घटा कर प्रत्येक खेप से वह एक लाख रुपये से ज्यादा की आम कमाती हैं। उनका यह उपक्रम इतना व्यवस्थित है कि उन्होंने भाकृअनुप-एनओएफआरआई से बनराज किसम की मांग प्रति वर्ष तीन खेप उत्पादन के लिए समय से पहले रखी। उन्होंने कुक्कट मांस उत्पादन के लिए बनराज किसम के महान स्थिति पालन से पूरी तरह से संतुष्टि प्रकट करते हुए उपक्रम को जारी रखा है।”

महिला उद्यमी सुश्री मंजू तिवारी, टेमी तारक, दक्षिण सिक्किम की सफलता गाथा प्रशंसनीय है। वह दो वर्षों से खरीदे गए कुक्कट किसम बनराज का पालन छोटे व पुराने घर को पोल्ट्री हाउस में बदलकर कर रही हैं। पोल्ट्री हाउस स्थानीय तौर पर उपलब्ध लकड़ी, मिट्टी, बांस, छत आवरण इत्यादि जैसी सामग्रियों से तैयार किया गया है, जिसमें लगभग 20 कुक्कटों का पालन किया जा सकता है। उनके द्वारा कुक्कट पालन महत्वपूर्ण त्योहार के दौरान कुक्कट मांस की मांग को पूरा करने के उद्देश्य से किया गया था। सभी चूड़ों को व्यावसायिक तौर पर उपलब्ध गोबर राशन द्वारा महान स्थिति में पाला गया। इसके लिए किसी भी प्रकार के अतिरिक्त मजदूर की आवश्यकता नहीं हुई। सुश्री तिवारी सुबह और शाम को मुर्गियों को दाना-पानी देने के लिए केवल आधा घंटा समय व्यय करती हैं। अल्प स्वास्थ्य सेवाओं जैसी आवश्यक वैकसीन एवं विशेष प्राथमिक उपचार और पूरक पोषण की मदद से कुक्कटों का वृद्धि प्रदर्शन बेहतर है। तीन माह की अवधि में 1.7 कि.ग्र. भार वाले कुक्कट 3.0 कि.ग्र. तक हो गये। उन्होंने 3 माह के आयु वाले कुक्कटों को बेचना शुरू किया और चौबीस माह तक सभी कुक्कट विक्रय हुए। इस प्रकार से बनराज आमनी पूर्ण पालन से उनकी वार्षिक आम 3 लाख रुपये से ज्यादा है। इसके साथ ही सुश्री तिवारी आवश्यक तकनीकी मदद के लिए भाकृअनुप-एनओएफआरआई, तर्दों के संपर्क में रहती हैं।

(स्रोत: भाकृअनुप-एनओएफआरआई, तर्दों)

खेती • अक्टूबर 2016 • 45

हाम्रो प्रजाशांक्त

सघन स्थितिमा घर-करेसोमा सफलतापूर्वक वनराज कुखुरा पालन

सुश्री मंजू तिवारी एक वर्ष में कुक्कटों को तीन खेप का पालन करती हैं। पालन खर्च व चूड़ों के क्रय लागत को घटा कर प्रत्येक खेप से वह एक लाख रुपये से ज्यादा की आम कमाती हैं। उनका यह उपक्रम इतना व्यवस्थित है कि उन्होंने भाकृअनुप-एनओएफआरआई से बनराज किसम की मांग प्रति वर्ष तीन खेप उत्पादन के लिए समय से पहले रखी। उन्होंने कुक्कट मांस उत्पादन के लिए बनराज किसम के महान स्थिति पालन से पूरी तरह से संतुष्टि प्रकट करते हुए उपक्रम को जारी रखा है।

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Zero-mortality Backyard Poultry Farming with Vanaraja (WBUAFS, Kolkata)

Rangabelia Tagore Society of Gosaba block has achieved a near impossible feat in backyard poultry farming with *Vanaraja*. Their intensive field monitoring of the management practices has achieved zero-mortality from day-old stage to sexual maturity in almost 50 percent of their beneficiaries. Shanatan Mandal, Khadeja S K., Prabir Mandal, Baburam Das, Bijoy Mandal, Krishna Pada Mirdha, Pranab Mandal are few among the innovative backyard farmers whose care and feeling for the birds are of highest order. It is heartening to see how they themselves remain hungry diverting wheat received from public distribution system to their *Vanaraja*. They have realized how *Vanaraja* saved their life when everything was washed out during storm, Aila.

Multi-breed and species Poultry Farm is the sole bread earner for the family of Basanti Gayen, Pakhirala, Gosaba block (WBUAFS, Kolkata)

Pakhirala was submerged by saline water for six days during storm-Aila. This rendered the land completely unproductive for any kind of crop for six years. Basanti Gayen's family was clueless about how to survive? Idea struck them. It is poultry farming-which is not that dependent on soil productivity. She learned as well as innovated the practices. Though, after long gap soil is slowly getting back its fertility but today she is more dependent on poultry farming which has fairly good amount of climate resiliency if managed scientifically. These days she managed a double storied wooden poultry house. Her stock includes *Vanaraja*, RIR, Deshi chicken and duck. She understands that different breeds/species of poultry have different market profiles. This helps her to maximize income from identical business volume.

Adoption of Backyard Poultry Farming by Kohistani Tribe of J&K for Livelihood (SKUAST, Srinagar)

Bela-wusan Nai-Basti is a small hamlet around 40 kilometres from Srinagar inhabited by Kohistani tribals most of whom are illiterate. The villagers have no source of income except for collecting wood in the nearby forests. **Noor Pathan**, the only graduate of the village approached KVK Ganderbal of SKUAST-Kashmir for technical knowhow of establishing a livestock farm. After a thorough survey it was found that the total population of the village is 3384 out of which 252 are keeping livestock. The villagers were usually marginal farmers with average land holding of < 1kanal. However the villagers were not ready to adopt the newer technologies and advices about livestock farming. Noor Pathan was encouraged to rear improved strains of poultry birds (*Vanaraja*). He took 100 birds in the month of June, 2016 and started their rearing under free ranging system. Regular visits were conducted to advise the farmer on different aspects of scientific poultry management. After 9 months, the farmer is very satisfied with the farming under free range system. The farmer has almost zero inputs on raising the birds and he is earning a decent livelihood. The farmer has adopted the farming of improved bird strains as a family business. In comparison to Desi birds the production of these improved birds is quite high. The birds obtained a body weight of 3-4 Kg in 7 months and around 70% birds were in lay while desi birds are yet to lay any eggs and weigh around 0.75 Kg. The farmer is fetching premium prices on the sale of the birds and eggs @Rs. 500-700/bird and Rs. 100/dozen respectively. The success of Noor Pathan has motivated other villagers also who now are approaching University for the supply of such kind of improved strains of chicks for farming.

Critical Observations

WBUAFS, Kolkata

Accomplishments and achievements

- Nine cycles of *Vanaraja* parents were reared.
- Supplied 63615 chicks of *Vanaraja* to farmers.
- Generated an amount of Rs. 7.5 lakhs revenue.
- Demonstrated two success stories of *Vanaraja* farming.

Short fall

- Target of germplasm was not achieved.
- Egg production was less.
- Data from the field not collected.

Suggestion for further improvement

- Efforts should be made to meet the target supply.
- PI is advised to check the feed quality and lighting period for improving the egg production.
- Data from the farmers fields need to be collected.

BAU, Patna

Accomplishments and achievements

- Three batches of parents were reared.
- Supplied 55329 chicks of *Vanaraja* to farmers.
- Generated Rs. 10.60 lakhs of revenue.
- Achieved the target of germplasm supply.

Short fall

- High grower mortality.
- Data from field was not collected.

Suggestion for further improvement

- Efforts should be made to control the mortality with the help of health experts from university or from the Nodal institute, DPR, Hyderabad.
- Data from the farmers fields need to be collected.

CKVV, Durg, Raipur

Accomplishments and achievements

- Two batches of *Vanaraja* parent lines were reared.
- Supplied 31224 *Vanaraja* germplasm to the farmers.
- Generated Rs. 8.85 lakhs of revenue.
- Collected field data on *Vanaraja* performance.

Short fall

- Target of germplasm was not achieved.
- Target body weights at 20 weeks was less.

Suggestion for improvement

- Efforts should be made to achieve the target supply.
- Feeding management and feed quality needs to be checked for maintaining the optimum body weight at laying.

RC of ICAR Research Complex, Jharnapani

Accomplishments and achievements

- Five cycles of parent rearing was in progress.
- A total of 81729 improved chicken germplasm was distributed to the farmers.
- An amount of Rs. 36.61 lakhs revenue was generated.
- Centre has achieved the germplasm supply target. The efforts of PI and his team are commendable.

Shortfall

- Mortality was high.
- Egg production was not consistent.

Suggestion for further improvement

- Feed quality and feed restriction should be ensured to improve the production consistency.
- Monitoring of chicks and parents in winter needs much attention to reduce the mortality.
- Provide dry environment especially during winter and rainy season.

RC of ICAR Research Complex, Gangtok

Accomplishments and achievements

- Two batches of *Vanaraja* parents were in position.
- Distributed 71407 chicks to the farmers in the rural and tribal areas of Sikkim.
- An amount of Rs. 32.87 lakhs of revenue was generated.
- Collected the data on body weight, egg production and other parameters.
- Two success stories were documented.
- The target supply was achieved. The efforts of the PI and his team are commendable.

Short fall

Nil

Suggestion for further improvement

- Provide dry environment especially during winter and rainy season.
- Monitor the feed restriction schedule properly to maintain the body weight at laying.

RC of ICAR Research Complex, Imphal

Accomplishments and achievements

- Two batches of *Vanaraja* and *Srinidhi* parents were reared.
- The centre has supplied 17,428 chicks to farmers.
- An amount of Rs. 20.26 lakhs of revenue was generated.
- Field data collected.
- Conducted awareness programs on poultry farming.

Short falls

- The target supply was not met.
- Mortality was high.
- Body weight at laying was high in parents.

Suggestion for further improvement

- Efforts should be made to meet the target supply.
- Proper monitoring feed restriction to control the body weight is needed.
- Strict biosecurity measures needs to be adopted at the Centre to prevent the disease out breaks.
- Efforts should be made to reduce the mortality.

TANUVAS, Hosur

Accomplishments and achievements

- Two batches of parents were in position.
- Distributed 1,15,318 chicks of *Vanaraja* and *Gramapriya* to the farmers in Tamil Nadu.
- Generated an amount of Rs. 23.77 lakhs revenue.
- Field data collected.
- The centre has achieved the target supply of one lakh chicks. The efforts of PI and his team are commendable.

Short fall

- Civil works not completed.

Suggestion for further improvement

- Efforts should be made to complete the civil works as early as possible.

ICAR-CCARI, Goa

Accomplishments and achievements

- One batch each *Gramapriya* and *Srinidhi* were in position.
- Collected data on body weight and production parameters.

Short fall

- Civil works not completed.
- Egg production is very low.

Suggestion for further improvement

- Civil works needs to be completed immediately.
- Parents should be reared in 3-4 cycles for continuous supply of chicks.
- Quality of feed, feed restriction needs to be monitored to maintain the body weight at laying.

ICAR-CIARI, Portblair

Accomplishments and achievements

- One batch of parents are in position.
- Collected the data on body weight, egg production and other parameters.
- Distributed 1300 chicks to the farmers and generated Rs. 0.32 lakh revenue.

Short fall

- Civil works not completed.

- b. Egg production is very low.

Suggestion for further improvement

- d. Civil works should be expedited.
- e. Parents should be reared in 3-4 cycles for continuous supply of chicks.
- f. Quality of feed, feed restriction schedule needs to be monitored for maintaining the body weight at laying.
- g. Lighting management needs to be monitored.

SKUAST, Srinagar

Accomplishments and achievements

- a. Completed the Civil works.
- b. One batch of parents were in position.
- c. Collected the data on body weight, egg production and other parameters.

- d. Distributed 2234 chicks to the farmers.

- e. Documented a success story on poultry farming.

Short fall

- a. Egg production is very low.

Suggestion for further improvement

- a. Parents should be reared in 3-4 cycles for continuous supply of chicks.
- b. Lighting management needs to be monitored.
- c. Monitoring of chicks and parents in winter needs much attention.
- d. Provide dry environment especially during winter and rainy season.

Proceedings of the Annual Review Meeting of AICRP on Poultry Breeding and Poultry Seed Project

24-25 May, 2016

ICAR Research Complex for Neh Region
Gangtok, Sikkim



ICAR-Directorate of Poultry Research
(Indian Council of Agricultural Research)
Rajendranagar, Hyderabad 500 030



Proceedings of the Annual Review Meeting of AICRP on Poultry Breeding and Poultry Seed Project

held on 24-25 May, 2016 at ICAR Research Complex for Neh Region, Gangtok, Sikkim

Inaugural Session

Chief Guest

Dr. P. Senthil Kumar IFS,
ADG Special Secretary, Govt. of Sikkim

Guest of Honour

Dr. R.S. Gandhi ADG (AP&B), ICAR

Dr. R.N. Chatterjee, Director, ICAR-DPR

The Inaugural Session was started with the Welcome Address by Dr. R.K. Avasthe. He welcomed the Chief Guest Dr. P. Senthil Kumar and Guest of Honour Dr. R.S. Gandhi ADG (AP&B), Dr. R.N. Chatterjee, Director, ICAR-DPR and Dr. V. Bhasin, Principal Scientist (AP&B), ICAR Head Quarter. He mentioned about the activities of the Sikkim centre in a nutshell. He mentioned that on 16th May 2016, Hon'ble Prime Minister of India, declared ICAR Research Complex for NEH Region, Sikkim, as National Organic Farming Research Institute, which is second of its kind in the world. Dr. Avasthe told that, they want to strengthen the projects of Animal Science Division in the centre. They have converted one whole village into backyard poultry farming village by supplying *Vanaraja* chicks to every family in the village. They want to further improve the rural poultry farming in the state of Sikkim through Poultry Seed Project.

Dr. R.N. Chatterjee, Director ICAR- DPR welcomed Dr. P. Senthil Kumar, Dr. R.S. Gandhi, Dr. V. Bhasin and all the centre In-charges. He thanked Dr. Avasthe for hosting the Annual Review Meeting of AICRP and PSP. He told that 12 AICRP centres located in different parts of the country are engaged in development of location specific varieties and 12 PSP centres are involved in supplying the improved rural poultry germplasm in different states of the country. In addition to this the AICRP centres are collecting and conserving the local native germplasm. He complemented Dr. Avasthe for his centre being the highest germplasm supply centre under PSP. He requested all the centre Incharges to actively participate in the deliberations.

Dr. Gandhi, ADG (AP&B) congratulated & complemented Dr. R.N. Chatterjee for the release of NARMADANIDHI from Jabalpur and *Jharsim* from

Ranchi AICRP centres. He appreciated that most of the centres are performing well and there is always a scope for improvement. He said that there are many success stories in different centres, which can become role model for other farmers. He suggested that Sikkim centre can produce organic chicken since the whole state is declared as organic state. He thanked Dr. Avasthe and his team for hosting the annual review meeting and conveyed his wishes for two days deliberations.

Dr. P. Senthil Kumar, Special Secretary, Govt. of Sikkim mentioned that, Sikkim is distinct being a tiny state and it is declared as the only organic state in the country. There is huge leap for the state and we should exploit this opportunity. The total land area is declared as organic in Sikkim, and there is every possibility to develop organic animal / poultry products. It needs further hardwork to achieve organic animal husbandry in the state. He requested the help of ICAR at this juncture and mentioned that the National Organic Farming Research Institute and ICAR have great role in taking forward the mission of organic farming. He mentioned that it is difficult to have large farms in the state of Sikkim only small to mediocre farms can be encouraged to make Sikkim a self-sufficient state for poultry meat. The Inaugural Session came to an end with formal Vote of Thanks proposed by Dr. U. Raj Kumar, Principal Scientist, ICAR-Directorate of Poultry Research.

Technical Session - I

Presentation of project coordinator's report

Dr. R. N. Chatterjee, Director, presented the Project Coordinator's Report of AICRP and PSP. Initially he presented the Action Taken Report on the recommendations of the previous Annual Review Meeting. He suggested that all the centres should give emphasis on bio-security in order to control mortality. He also suggested to take the help of Dr. M.R. Reddy, Principal Scientist, DPR, as and when required. He presented the progress of Mannuthy and Anand centres. He suggested that these centres can concentrate on development of location specific varieties and also to improve the germplasm supply. While presenting progress of earlier broiler centres,

he mentioned that germplasm supply is very good from Bengaluru centre (1.18 lakhs) and requested Ludiana and Bhubaneswar centres to improve the germplasm supply. He told that among earlier rural centres, Agartala and Palampur centres, to expedite the process of development of location specific varieties. He suggested that all the centres should send the Audit Utilization Certificate by the end of June, 2016. Dr. Bhasin, enquired about the modus operandi after development and release of location specific varieties. Dr. Chatterjee, said that the native germplasm may be conserved, the parent lines to be improved and more number of germplasm need to be supplied to the farmers of respective states. Dr. Bhasin enquired whether parents can be supplied to the interested farmers. Dr. Chatterjee, replied that the parents cannot be given to private agencies. Dr. Bhasin, enquired as to, how soon the Srinagar centre can survey and collect Kashmiri favorella? Dr. Azmat Khan from Srinagar centre replied that, it is difficult to carry out this work only with University funds, therefore, he requested for an AICRP centre at Srinagar. Dr. Bhasin advised them to initially collect some birds and ask for support from ICAR. Dr. Chatterjee, advised all the In-charges to take permission from respective State Bio-diversity Boards before supply of local native germplasm and crosses involving these local native germplasm. He further added that all the new centres under PSP to complete the development of infrastructure facilities.

AICRP centres

Anand Centre

Dr F.P. Savaliya, Incharge, Anand Centre, presented the progress of Anand Centre. Dr. Chatterjee enquired about the low fertility and reduction in egg production compared to the previous generation. Dr. Savaliya, replied that the age of the flock was more than 80 weeks and mortality was more due to severe heat during summer leading to reduction in egg production. Dr. Bhasin, asked the cause for increased mortality in native chicken during brooding period. Dr. Savaliya, replied that it was due to non-specific reasons like dehydration. Dr. M.R Reddy, Pr. Scientist from DPR suggested to maintain proper brooding temperature and to provide electrolyte in water. Dr. Bhasin told to give ten generation's frequency distribution for egg production.

Mannuthy Centre

Dr. (Mrs) C.S. Suja, presented the achievements of Mannuthy centre. She presented the 10 generation's

frequency distribution for egg production and showed how the egg production is increasing over 10 generations. Dr Chatterjee enquired about the plumage colour and egg production of Tellicherry breed. Dr. Suja replied that it is black in colour and produces about 70 eggs annually. Dr Bhasin complemented the centre for lower mortality in spite of heavy rains and high humidity.

Bengaluru Centre

D. C.S. Nagaraja presented the performance of Bengaluru centre. Dr. Chatterjee enquired about the purification of native germplasm that is collected. Dr. Nagaraja replied that since full black and white birds are not preferred hence they are removed totally. Dr. Chatterjee suggested for introducing new blood into PB 1 and PB 2 from Ludhiana. Dr. Nagaraja also told that the performance of the broiler cross was 1.58 kg at 6 weeks and 2.12 kg at 7 weeks. Dr. Bhasin told to calculate the cost of production and submit it within 10 days to DPR.

Ludhiana Centre

Dr.S.K. Das presented the achievements of Ludhiana centre. Dr. Chatterjee told to take steps to reduce high mortality during brooding period. Dr. Chatterjee advised to do brooding between December and January. Dr. Das replied to a query from ADG, regarding reduction in 5 week body weight is due to feed problem. Dr. Bhasin told him to present frequency distribution for 5 week body weight for last 10 generations. Dr. Das told that the supply by the centre became less because the state government established 8 to 10 state poultry farms for chick distribution.

CARI Centre

Dr. Saxena Presented the progress of the CARI, Izatnagar. He mentioned that during survey it was found that the local farmers choice was broiler type birds and the centre has collected local native germplasm. He told that in RSPPT, CARIBRO-Dhanraj attained 1.58 kg body weight at 6 weeks and 1.88 kg at 7 weeks with FCR of 2.5.

Bhubaneswar Centre

Dr. N.C. Behura presented the progress of the Bhubaneswar centre. Dr. Gandhi enquired about the reasons for high mortality. Dr. Behura replied that it was due to different age groups that are maintained at the farm. Dr. Chatterjee enquired about the renovation of brooder house. Dr. Behura told that brooder house renovation had been completed. Dr.

Bhasin suggested that all the broiler centres should present frequency distribution data for 5 week body weight for last 10 generations

Agartala Centre

Dr. Vinay Singh presented the progress of the Agartala centre. Dr. Chatterjee told that the centre should speed up the development of location specific variety. Dr. Vinay Singh replied that three way cross has been developed and its evaluation under field conditions is in progress. Dr. Bhasin enquired about the target of the centre. Dr. Vinay Singh told that the centre could not meet the demand of germ plasm supply due to outbreak of bird flu in the state two years back. Dr. Gandhi advised to monitor the centre for every 3 months and help in development of the location specific variety.

Jabalpur Centre

Dr. J.K. Bharadwaj presented the achievements of the Jabalpur centre, Dr. Gandhi advised to keep the mortality under control. Dr. Bharadwaj requested for incubator and hatcher for which Dr. Chatterjee told him to send the requisite proposal. Dr. Bhasin enquired about the demand for NARMADANIDHI. Dr. Bharadwaj replied that there is very good demand for NARMADANIDHI in Madhya Pradesh. They are also supplying the said breed to Chattisghar and Jharkand states through ATMA and NGO.

Udaipur Centre

Dr. O.P. Pathodiya presented the progress of Udaipur centres. Dr. Chatterjee told to apply for RKVY for supplying *Pratapdhan*. Dr. Pathodiya replied that they have purchased chicks from the project under RKVY and supplying to the farmers. Dr. Bhasin enquired about the selection criteria for native population. Dr. Niranjana told that all the native populations have to be selected based on 40 week egg production. Dr. Bhasin told to improve the production and supply of *Pratapdhan* by supplying parents to state government farms and also under RKVY project.

Palampur Centre

Dr. Varun Sankhyan presented the progress of Palampur centre. Dr. Chatterjee enquired about the status of location specific variety development. Dr. Sankhyan replied that the performance evaluation of three way cross will be completed during the year 2016-17. Dr. M.R. Reddy informed the gathering that when one local breed and crosses involving that breed are sold, 0.1% of sale amount should be

deposited with respective State Biodiversity Board. Dr. Chatterjee told to send related documents in this regard to all the centres. Dr. Bhasin suggested to reduce the mortality.

Guwahati Centre

Dr. Niranjana Kalita presented the progress of Guwahati centre. Dr. Kalita replied for a query that three posts were filled and one post is vacant at Guwahati centre. Dr. Chatterjee enquired whether native population is maintained as pedigreed population. Dr. Kalita replied that native population is being maintained as pedigreed population.

Ranchi Centre

Dr. Sushil Prasad presented the progress of Ranchi centre. Dr. Bhasin told to control the mortality at the centre. Dr. Chatterjee mentioned to expedite the release of new location specific variety developed by the centre. Dr. Sushil Prasad replied that the variety will be released during first quarter of 2016-17.

Technical Session-II

Poultry Seed Project

Sikkim Centre

Dr. Rafiqul Islam, Sr. Scientist presented the progress of the Centre. He narrated the different activities that were undertaken under PSP as well as TSP and expressed the constraints of space for rearing parents. The house asked to collect the economics on *Vanaraja* farming in Sikkim. Dr. Avasti, JD, Sikkim centre had also stressed the need of the space. Dr. R.N. Chatterjee, Director, DPR assured for providing the space as per the approved EFC proposals. The house complimented the efforts of Dr. Avasthe and his team for good work done by the Centre.

Nagaland Centre

Dr. Mahek Singh, Scientist presented the progress of Nagaland centre. The house enquired about the shortage of targeted germplasm supply. Dr. Singh expressed the practical difficulties like Machine failure, frequent power breakdowns and assured the house that he will put all efforts to meet the target in the coming year. He stressed the requirement of one more setter and a generator. Dr. R.N. Chatterjee, Director, DPR asked to utilize the revenue generated funds for the purpose with approval from the Director of the institute.

Kolkata Centre

Dr.S.Pan, Professor, presented the progress of the Centre. He stressed the demand of *Vanaraja* as small scale intensive broiler in West Bengal. He expressed the requirement of water tank at the centre. Dr. Pan also expressed the limitation of floor space. Dr.R.S.Gandhi and Dr.Bhasin told to utilize the funds generated at the centre for the purpose. Dr. Pan requested to send a communication to Vice Chancellor of the University from the Council/DPR. Dr.R.N.Chatterjee, Director agreed to send a communication to all the Centres regarding utilization of funds generated at the centres.

Durg Centre

Dr.Mukharjee, Professor & PI of the centre presented the progress of the Centre. Dr. Bhasin enquired as to why the centre has not achieved the target. The PI informed that the Centre is slowly working on improving the germplasm supply and assured the house that the target will be achieved in the coming year. He requested for feed storage. The performance of the Centre will be reviewed next year and a suitable decision will be taken in the Annual review meeting.

Patna Centre

Dr.K.G.Mandal, Professor & PI of the centre presented the progress of the Centre. The centre could not achieve target fixed and the mortality was above 40% which is unusual. The PI was informed to control the mortality by taking appropriate measures with the help of Dr.M.R.Reddy, DPR and to reduce the parent stock. The centre should rationalize the parent rearing and chick production based on the demand. He was asked to discontinue *Gramapriya* and to concentrate on *Vanaraja* parent rearing. The performance of the Centre will be reviewed next year and a suitable decision will be taken in the ensuing Annual Review Meeting.

Hosur Centre

Dr.S.Samsuddin, Professor presented the progress of the centre and explained about different activities and propagation model followed in Tamil Nadu with the help of different extension units. Civil works and procurement of equipments were in progress. The progress of the centre was found satisfactory.

Srinagar Centre

Dr.A.A.Khan, Associate Professor & PI of the centre presented the progress of the Centre. He explained the difficulties in brooding the chicks during the winter and requested to supply parents during July.

Director, DPR agreed and assured him that parents will be provided in July. All civil works were nearing completion. Dr.Bhasin, asked Dr.Khan to take up *Khasmir favorella* conservation work.

Portblair Centre

Dr.A.Kundu, Principal Scientist & Head(AS), presented the progress of the Centre. He narrated the *Vanaraja* parent rearing and progress of the works and equipments.

Goa Centre

Dr.R.S.Rajkumar, Scientist presented the progress of the Centre. He explained about the parent rearing and progress of the works & equipments. The target was revised for this Centre to 50,000 for the coming year.

Mukteswar Centre

Dr. A.K.Sharma, Principal Scientist narrated the difficulties in initiating the work at IVRI, Mukteswar. Dr.R.N.Chatterjee, Director informed the house that the matter is pending at ICAR, Head quarters. He asked Dr.Sharma, whether it will serve the purpose if we relocate the centre to Pantnagar. Dr. Sharma commented that it may be easy for operational point of view but may not be possible to reach to interior regions of Himalayas.

Plenary session

Dr. Chatterjee informed that all the centres should perform well inspite of constraints and challenges. He mentioned that this is the final year of XII five year plan and purchase of equipment, renovation and all the construction works should be completed before March 2017. He said that all the presentations should be crisp and in uniform format, mortality is high at many of the centres and suggested to take help of Dr. M.R. Reddy. He thanked Dr. R. S. Gandhi ADG (AP&B) and Dr. Vineet Bhasin for their comments and suggestions.

Dr. R.S. Gandhi suggested to change all the sign boards and prefix ICAR in front of institute name. All the centres should send AUC by the end of June, 2016 otherwise second installment of funds will not be released. The mortality is high at most of the centres and strict biosecurity measures need to be followed. The work load on the centre incharges should be reduced by the concerned University in order to concentrate more on project work. A letter to this effect may be sent to respective Universities. Infrastructure facilities should be completed before

the end of March 2017. He thanked Dr. R. K. Avasti and his team for their hospitality and hosting the AICRP and PSP review meeting.

Dr. M. Niranjana, Incharge AICRP Cell, DPR, proposed formal Vote of Thanks.

Recommendations

General

1. All the AICRP & PSP centres have to take permission from State Biodiversity Board to supply native germplasm /crosses and various native germplasm that the centres maintain.

AICRP

1. The centres maintaining layer & broiler should present frequent distribution of primary traits for last 10 years.
2. The centres need to follow strict biosecurity measures to control mortality

3. The centres that have developed location specific varieties need to explore other means for germplasm supply.

4. The work load on the centre in-charges should be reduced by the University authority and a letter to this effect should be sent to respective Universities.

PSP

1. The Centre should meet the set target of germplasm supply.
2. The new Centres should expedite the construction works and complete them by the end of XII plan period.
3. Patna and Durg Centres should meet the set targets during the next financial year otherwise a final decision will be taken for continuing the centres.
4. The revised target for Goa is 50,000 chicks.

Action Taken Report on the Recommendations of AICRP and PSP Annual Review Meeting

held on 24-25 May, 2016 at ICAR Research Complex for Neh Region, Gangtok, Sikkim

Recommendations	Action Taken
General	
All the AICRP & PSP centres have to take permission from State Biodiversity Board to supply native germplasm /crosses and various native germplasm that the centres maintain.	Informed to all AICRP and PSP centres
AICRP	
The centres maintaining layer & broiler should present frequent distribution of primary traits for last 10 years.	Complied with
The centres need to follow strict biosecurity measures to control mortality	Complied with
The centres that have developed location specific varieties need to explore other means for germplasm supply.	Informed to all the centres
The work load on the centre in-charges should be reduced by the University authority and a letter to this effect should be sent to respective Universities.	Complied with
PSP	
The Centre should meet the set target of germplasm supply.	Complied with
The new Centres should expedite the construction works and complete them by the end of XII plan period.	Construction works are in progress in some centres
Patna and Durg Centres should meet the set targets during the next financial year otherwise a final decision will be taken for continuing the centres.	Complied with. Patna centre achieved the target
The revised target for Goa is 50,000 chicks.	Complied with



AICRP and PSP Annual review meeting in progress at ICAR-NOFRI Gangtok, Sikkim



A flock of CSML Breeders at Bubhaneshwar



Training Programme in Poultry Farming at ICAR-NOFRI Gangtok, Sikkim



A flock of Hansli Chicken at Bubhaneshwar



Indigenous Chicken flock at Bengaluru



Cocks of PB-1 at Bengaluru centre



Flock of PB-2 at Bengaluru centre



Jharsim birds under free range conditions in Jharkhand



A pair of *Jharsim* Chicken



Jharsim birds under free range conditions in Jharkhand



Hens of *Kamrupa* under field conditions



A flock of *Kamrupa* under farmers backyard in Assam



Pratapdhan Cocks



Pratapdhan Hens



A pair of *Pratapdhan* from Udaipur



Layer flock at Mannuty



Women farmer with *Vanaraja* birds in West Bengal



A flock of *Vanaraja* birds



A flock of *Vanaraja* birds in the households in West Bengal



Women farmer with *Vanaraja* birds in Chhattisgarh



Vanaraja in backyards of Nagaland



Women farmer with *Vanaraja* and *Srinidhi* birds in Nagaland



Woman farmer with *Vanaraja* growers in Nagaland



Vanaraja birds in the households of farmers in Bihar



Women farmers with chicks in Manipur



Vanaraja birds in Kashmir



Vanaraja women farmer in Sikkim



Vanaraja under field conditions in Sikkim



Woman farmer with *Vanaraja* birds at Sikkim



Woman farmer with *Vanaraja* birds at Sikkim



Vanaraja birds in rural backyards of Sikkim



Vanaraja birds in rural households of Sikkim

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