Breeding and Genetics: Poultry Breeding

M78 Genetics of immunocompetence traits in Aseel native chicken of India. S. Choudhary*[1], S. Kumar[2], and B. Nautiyal[1], [1]*MJP Rohilkhand University, Bareilly, U.P. India,* [2]*Central Avian Research Institute, Bareilly, U.P. India.*

Breeding chickens for higher immunocompetence and disease resistance provides a valuable approach for commercial poultry production. Several immunocompetence traits that can be considered for improving genetic resistance to diseases in poultry are greater antibody response to sheep RBC, lysozyme activity and high titer of immunoglobulin G (IgG) in the serum. Antibody titers against sheep RBC and serum IgG level are the indicators of humoral immune response, whereas bacteriolytic activity of serum lysozyme is the indicator of non-specific immune response. In the present study Aseel (n = 301), an Indian breed of chicken, was studied for high and low immune response by assessing their immunocompetence traits using 3 different tests - hemagglutination (HA) test, lysozyme plate assay and serum IgG level estimation. The data generated on immunological traits were analyzed by least squares ANOVA. The average (expressed as mean+ standard error) HA titer, serum lysozyme activity and IgG level was 8.14 ± 0.35, 4.85 ± 0.20, 10.82 ± 0.64 in males and 8.15 ± 0.31, 4.48 ± 0.22, 12.64 ± 0.75 in females, respectively. Sex of the birds had no effect ($P > 0.05$) on HA titer, lysozyme level and serum IgG level. However, male birds revealed higher IgG level ($P < 0.07$) than the female. We concluded that Aseel has high immune competence status in comparison to broiler and desi fowl chicken reported earlier in the literature.

Key words: Aseel, Immunocompetence traits

M79 Study on the diversity of Yunnan original chicken meat using NIR spectroscopy based on principal component analysis and cluster analysis. J.-L. Wu[1], X. Gao*[1], Y.-Z. Li[3], Y.-F. Yin[1], and Y. Li[2], [1]*Yunnan Animal Science and Veterinary Institute, Kunming, Yunnan, China,* [2]*Sweden Perten Instruments Representative Office in China, Beijing, China,* [3]*University of Minnesota, Morris.*

The aim of this study was to investigate the feasibility of using near-infrared (NIR) spectroscopy to identify genetic characteristics of meat quality of Yunnan original chicken breeds. A total of 1310 breast muscle samples collected from 25 original breeds of chicken in 28 counties located in 14 regions of Yunnan Province were analyzed using PERTEN DA7200 NIR spectrophotometer. Data were analyzed by using principal component analysis (PCA) of the Unscrambler (CAMO) software and cluster analysis (CA) of the SPSS software. The results show that the NIR of the 25 breeds of Yunnan original chicken are basically identical. Spectra transformed by SNV, 9 point smoothing, and the first derivative, indicate that absorption band of each breed was significantly different in the range of 1000 to 1050nm, 1130 to 1150nm and 1370 to 1400nm. The greatest difference was observed between the Nixi and the Xichou chicken breeds. Principal component analysis indicated that the NIR spectra of each breed was different, particularly in 5 breeds of the Xichou, Zhenyuan-Piao, Nixi, Luxi Ae, and Huaping-Wu chicken. After pretreatment with Euclidean distance spectrum of the CA, a certain Euclidean distance can be divided into distinctive breeds. The Xichou and Nixi chicken had the most remarkable specificity, with the Euclidean distance of 1 between the 2 breeds. Xichou chicken distribute the southeast of Yunnan and Nixi chicken distribute chicken distribute the northwest of Yunnan, the 2 breeds did not show any genetic connections, probably due to the longest geographical distance of their origin. These results suggest that the 5 breeds are best represent genetic resources of the original chicken, with the greatest conservation value. Meanwhile, this study indicates that NIR can be used to accurately and quickly analyze genetic characteristics of meat quality in chicken breeds and identify genetic resources of special chicken breeds.

Key words: original chicken breed, meat, near-infrared

M80 Breed and egg size effects on weight loss during incubation of Broiler eggs. O. T. F. Abanikannda*, A. O. Leigh, and A. O. Giwa, *Lagos State University, Ojo-Lagos, Nigeria.*

Physiological processes that take place during incubation of eggs often resulted in changes in egg weight during the period. This study investigates the effect of breed and egg sizes on weight loss at 3 points between incubation and hatching viz: pre-incubation, 18th day of incubation, chick weight at hatching. A total of 1002 hatchable eggs from 3 strains; Anak (n = 361), Marshall (n = 359) and Ross (n = 282) of Broiler breeders were weighed and measured using digital weighing scale and digital caliper. Weight, length and width were taken before incubation, while shape index was also computed. Weight losses from incubation to 18 d (WtLoss1), 18th day to hatching (WtLoss2) and incubation to hatch (WtLoss3)] were computed. The Minitab statistical software was used for basic descriptives, regression analyses and statistical modeling of the data. The model used for the regression analysis is described by $Y_{ijklm} = \mu + \alpha_i + \beta_j + \theta_k + \rho_l + \varepsilon_{ijklm}$ describing each of the 3 response variables. Egg weight was between 44.60g and 81.70g, while egg length ranged between 49.99mm and 69.98mm, and egg width was between 38.54mm and 56.75mm, while shape index was between 61.44% and 99.02% across the 3 strains studied. The largest source of variation was breed effect, which was highly significant ($P < 0.001$) on all 4 variables. Similarly, breed significantly ($P < 0.001$) impacted on WtLoss1 and Wt Loss3 but was not a significant ($P > 0.05$) source of variation on WtLoss2. All the predictor variables were significantly ($P < 0.05$) correlated to the response variables except shape index, which had negative and non-significant ($P > 0.05$) correlation with the weight losses. The very low negative and non-significant correlation between egg weight and egg weight loss up to the 18th day of incubation indicated that weight loss was slower in bigger eggs compared with relatively smaller eggs. The study revealed that breed was a significant source of variation on weight loss at the 18th day of incubation (WtLoss1) and throughout the entire period of incubation and hatching (WtLoss3) but was not significant on weight loss after the 18th day (WtLoss2).

Table 1. Egg weight loss at different stages of incubation and hatching by breed

Breed	N	WtLoss 1 (%)	WtLoss 2 (%)	WtLoss 3 (%)
Anak	361	13.75±0.19[a]	19.12±0.47	32.87±0.44[a]
Marshall	359	12.86±0.15[b]	18.37±0.42	31.22±0.42[b]
Ross	282	11.69±0.25[c]	19.41±0.40	31.10±0.36[b]
Combined	1002	12.85±0.11	18.93±0.25	31.78±0.24

[a–c]Means with different superscripts within the same column differs significantly ($P < 0.05$).

Key words: broiler, incubation, weight loss

M81 Estimation of genetic parameters for body weight traits in Mazandaran indigenous chicken. S. Niknafs*, A. Nejati Javaremi, H. Mehrabani Yeganeh, and A. Fatemi, *Agricultural Faculty, University of Tehran, Karaj, Alborz, Iran.*

A breeding station for Mazandaran native chicken was established in 1988 with 2 main objectives: extension and genetic improvement of the local breed. For 18 generations, selection was done for 8-wk BW (BW8), egg number, age at first egg and average egg weight as selection criteria. Besides these traits, some other traits were recorded. As the aim of the current study we estimated genetic parameters for body weight traits including body weight at hatch (BW1), at 8 (BW8), at 12 weeks of age (BW12) and at sexual maturity (WSM). Univariate (for estimating variance components) and bivariate (for estimating covariance components) animal models were fitted using ASREML procedure. The highest and lowest magnitude of heritability estimates belonged to WSM and BW8, respectively. BW8 has been included in selection criteria, so relatively lower heritability may be due to decreased genetic variance during selection process. Genetic correlation between BW8 and BW12 was close to unity. Also, high genetic correlation between BW12 and WSM was observed. Other genetic relationships were moderate generally. No remarkable environmental correlations were obtained among these traits except for moderate environmental relationship between BW8 and BW12.

Table 1. Statistical description of data set, heritabilities (diagonal in bold), genetic (above diagonal) and environmental (below diagonal) correlations of investigated traits (±SE)

Trait	BW1	BW8	BW12	WSM
No of Animal in Data File	35287	43067	38297	31147
Mean	35.53	563.7	953.9	1694
Coefficient of Variance	8.15	17.09	14.49	11.90
BW1	0.46±0.01	0.37±0.02	0.36±0.02	0.41±0.02
BW8	–0.03±0.00	0.24±0.00	0.91±0.00	0.57±0.02
BW12	–0.04±0.01	0.47±0.00	0.29±0.01	0.69±0.01
WSM	–0.09±0.01	0.16±0.01	0.19±0.01	0.47±0.01

Key words: body weight, chicken, genetic parameters

M82 Genetic and phenotypic trends for body weight and egg production in Mazandaran indigenous chicken. S. Niknafs*, A. Nejati Javaremi, H. Mehrabani Yeganeh, and A. Fatemi, *Agricultural Faculty, University of Tehran, Karaj, Alborz, Iran.*

The study of genetic trends is a way for monitoring the selection process. Phenotypic information collected during 1988 to 2009 (18 successive generations of selection) in breeding station of Mazandaran native chicken were analyzed to estimate genetic and phenotypic trends. This population has been selected for traits body weight at 8 weeks, egg number, sexual maturity age and egg weight. Univariate animal model in ASREML software was applied to estimate breeding values. Trends for breeding values and phenotypic performance were obtained by regression of average breeding values and phenotypic least squares means, respectively, on generation number. The table below shows regression coefficients of genetic and phenotypic trends. Results showed that selection can lead to genetic progress in whole recorded traits, except for traits EW28 and EW12. Significant changes in phenotypic level were observed just for BW1, BW8 and WSM, which could be caused by negative environmental trends. Also, inbreeding coefficient on average has increased with the rate of 0.0058 ($P < 0.0001$) per generation of selection.

Table 1. Regression coefficients of average breeding values and phenotypic LSM on generation with *P*-values

Trait	Genetic Trend	$P <$	Phenotypic Trend	$P <$
BW1	−0.035	0.0001	−0.36	0.0164
BW8	2.98	0.0001	9.32	0.0181
BW12	4.74	0.0002	2.3	0.8240
WSM	−4.16	0.0023	21.4	0.0043
ASM	−1.35	0.0001	0.042	0.9497
EN	0.95	0.0001	−0.31	0.2652
EW1	−0.185	0.0001	−0.045	0.6110
EW28	−0.002	0.8684	−0.034	0.8769
EW30	−0.046	0.0184	−0.017	0.9336
EW32	−0.065	0.0040	−0.013	0.9453
EW12	0.01	0.4695	0.061	0.5408
EM	43.8	0.0001	−12.5	0.3665
EINT	1.46	0.0001	−0.103	0.7482

Key words: genetic trends, body weight, egg production

M83 Heritability and genetic correlation estimates for egg production related traits in Mazandaran indigenous chicken. S. Niknafs*, A. Nejati Javaremi, H. Mehrabani Yeganeh, and A. Fatemi, *Agricultural Faculty, University of Tehran, Karaj, Alborz, Iran.*

The best way to improve the productivity of indigenous chickens, without altering any of the morphological characteristics, is to select for production traits within a given population. Such strategy needs accurate estimates of genetic parameters. To achieve this purpose phenotypic information for 18 successive generations which was collected during 1988–2009 in the breeding station of Mazandaran native chicken (north of Iran) were analyzed. Univariate and bivariate animal models in ASREML procedure were used to estimate (co) variance components for traits of age at sexual maturity (ASM) (31349 records), egg number (EN) (31349), average egg weight at 28 (EW28) (17225), 30 (EW30) (19031), 32 (EW32) (18955) weeks of age and average egg weight for first 12 weeks of production (EW12) (18847). Heritabilities, genetic and environmental correlations are shown in the table below. Heritability estimates of egg production traits varied from 0.17 ± 0.01 to 0.43 ± 0.01. Among these traits egg number seemed to be less heritable than others. Genetic correlations among egg weight traits (EW28, EW30, EW32 and EW12) were close to unity. Also, rather moderate environmental correlations among these traits were found. Low negative genetic correlations were obtained between egg number and egg weight traits. Sexual maturity age is moderately negatively genetically correlated with egg number, whereas it has low positive genetic correlations with egg weight traits.

Table 1. Heritabilities (diagonal), genetic (above diagonal) and environmental (below diagonal) correlations (±SE)

Trait	ASM	EN	EW28	EW30	EW32	EW12
ASM	0.36±0.01	–0.41±0.03	0.24±0.03	0.20±0.03	0.21±0.03	0.46±0.03
EN	−0.09±0.01	0.17±0.01	–0.29±0.05	–0.24±0.04	–0.26±0.04	–0.24±0.05
EW28	0.02±0.01	0.02±0.01	0.32±0.01	0.99±0.00	0.98±0.00	0.98±0.00
EW30	0.01±0.01	–0.01±0.01	0.35±0.01	0.41±0.02	0.99±0.00	0.98±0.00
EW32	0.02±0.01	–0.00±0.01	0.30±0.01	0.36±0.01	0.43±0.01	0.97±0.00
EW12	0.19±0.01	0.02±0.01	0.40±0.01	0.38±0.01	0.37±0.01	0.37±0.02

Key words: genetic parameter, egg production, chicken