

Estimation of genetic and phenotypic parameters for some productive traits in poultry

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Two native strains namely Mandarah (MN and Matrouh (MT) were used in crossing experiment. This experiment was carried out in the Poultry Breeding Research Station at Inshas, Sharkia Governorate, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt in the period from March 1990 to December 1991. A total number of 408 dams and 34 sires from each strain were chosen randomly to get purebred and crossbred progeny. The F1 purebreds, F1 cross and F1 reciprocal cross progeny were produced in one hatch with a total of 3092 chicks. Body weight (BW) at hatch and biweekly, thereafter up to 16 weeks of age for strains and their crosses were recorded. Daily gain (G) and livability (L) biweekly were computed. Three eggs in successive months were taken from each daughter within each strain and their crosses (602 daughters) to study traits of egg characteristics with a total number of 1806 eggs. Linear contrasts of mating type least squares means were computed to quantify differences attributable to sire breed, dam breed and direct heterosis effects. Genetic and phenotypic correlations among traits and heritabilities were also estimated. Breed group was found to have a significant source of variation on body weight and daily gain at different ages. Breed of sire and breed of dam was found to have a highly significant effects at all ages studied on body weight and at most intervals of age on daily gains, while, non-significant sire breed and dam breed effects on livability trait at all intervals of age. Sex and breed group by sex interaction was found to have a significant source of variation on body weight, daily gain and livability trait at all ages studied. No consistent trend in the superiority of any strain of purebreds for body weight and daily gain at all ages, while the linear contrasts of their differences were significant. Matrouh purebred mating resulted in a higher chick livability than the Mandarah purebred mating at all ages. Crossbred chicks expressed higher body weights and daily gains than those of purebred chicks at different ages, while, crossbreeding between Mandarah and Matrouh strains did not improve chicks livability. Significant heterotic effect for body weights and daily gains were found at all ages, while, non-significant heterotic effect was found for livability trait. Direct heterosis contrasts for livability trait indicate that crossing between Mandarah and Matrouh strains was associated with a reduction in chick livability from 2 to 12 weeks of age. Heterosis percentages ranged from 12.8 to 27.5 %, 1.7 to 29.5 % and -1.3 to 4.3 % for body weight, daily gain and livability trait, respectively. Mandarah-damed chicks were generally had heavier body weight, higher daily gains and higher livability compared to Matrouh-darned chicks. Little contribution of sire breed than dam breed effects in the inheritance of body weight was observed. Sire breed of Matrouh had better performance than Mandarah for growth traits and chick livability. This may encourage the breeders to use males of Matrouh as a sires with females of Mandarah as a dam to improve meat production and chick livability in local strains. Percentages of dam variance component for body weights (from hatch to 12 weeks) were higher (averaged 11.96%) than those of sire component (averaged 6.88%), while the proportion of variance due to sire (averaged 8.59%) increased in later ages (14 and 16 weeks of age) than due to dam components (averaged 6.67%). The same trend was observed for daily gain, the proportion of variance components due to dam (averaged 8.25%) were higher than due to sire (averaged 4.80%) from hatch up to 10 weeks of age, while, it decreased thereafter. Therefore, maternal effects can be considered as an important factor in early ages, while, sex-linkage effects can be considered

as important factor in later stages. Moderate estimates of heritability due to sire (ranged from 0.155 to 0.360), dam (ranged from 0.251 to 1.236) and sire+dam components (ranged from 0.228 to 0.723) for body weight, while, low estimates of heritability due to sire components (ranged from 0.111 to 0.273), dam (ranged from 0.046 to 0.480) and combined estimates of heritability (ranged from 0.079 to 0.362) for daily gain at different age intervals. Higher estimates of genetic correlation (averaged 0.63) among body weights at different ages were obtained than those of phenotypic correlation (averaged 0.476). This may be due to genes which influence body weight are more persistent in their effects than the environmental factors which they are more temporary in nature. Egg production through the first three months after sexual maturity indicate that Mandarah purebred strain had higher body weight at sexual maturity, earliest age at sexual maturity, more egg number, heavier egg weight, higher rate of laying, large clutch size and small clutch number than Matrouh purebred strain. Generally, crossbreds matured early, heavier body weight, more egg number, higher rate of laying, higher clutch number and clutch size than purebreds. Among the crossbreds, Mandarah sire crosses matured early, more egg number, higher rate of laying, and higher clutch size than Matrouh sire crosses. While, Matrouh sire crosses had heavier body weight at sexual maturity and highest clutch number. Breed group was found to have a significant source of variation on egg weight, albumen weight, yolk weight, Haugh unit, egg shape, yolk index, shell thickness width, shell thickness broad and egg specific gravity. Significant sire effect was found on egg specific gravity and Haugh unit and significant dam effect on all traits of egg contents, shell thickness and egg shape index. Significant effect of Month of laying was obtained on all traits of egg contents, egg indices, shell thickness, Haugh unit and egg specific gravity. Also, breed group by month interaction was found to be highly significant effect on most traits studied. Mandarah purebred had higher egg weight, albumen weight, yolk weight and egg specific gravity than Matrouh purebred. While, Matrouh purebred had higher egg shape index, yolk index and shell thickness at both width and broad regions. Means of crossbred chickens were higher than those of their pure parental breeds for egg weight, albumen weight, egg specific gravity, egg shape index, albumen index, yolk index and Haugh unit, while, crossbreeding was associated with small reduction for yolk weight, shell weight and shell thickness. Purebred differences were significant for egg weight, albumen weight, yolk weight and both of shell thickness at width and at broad. Significant heterotic effect for egg weight, albumen weight, yolk weight, shell weight, egg shape index, albumen index, yolk index and Haugh unit. Crossbreeding was associated with an existence of heterotic effects on egg weight, albumen weight, egg specific gravity egg shape index, albumen index yolk index and Haugh unit, while, crossbreeding was associated with a reduction in yolk weight, shell weight and shell thickness. Dam additive effects were significant for egg weight, albumen weight, shell weight, egg specific gravity, yolk index and shell thickness. Sire additive effects were significant for egg weight, albumen weight, shell weight and egg specific gravity. Thus, MNxMT matings had better performance for egg weight, albumen weight, yolk weight, egg specific gravity, yolk index and shell thickness, while, MTx MN matings had higher performance than the reciprocal cross for shell weight. The proportion of variance components due to dam were higher than those of sire for egg weight, albumen weight, yolk weight, shell weight, egg shape index, albumen index yolk index and shell thickness, While, opposite trend for egg specific gravity and Haugh unit. High estimates of heritability due to dam components for egg weight, albumen weight, yolk weight, shell weight, shell thickness, egg shape index and albumen index than those of sire components indicating that these traits are largely affected by maternal influences. Otherwise, estimates of heritability due to sire were higher than those of due to dam for egg specific gravity, yolk index and Haugh unit indicating that these traits are largely influenced by additive genes transmitted from sire. High positive genetic correlation coefficients among traits of egg components and among traits of shell thickness and between egg weight and each of egg specific gravity, egg shape index, yolk index and Haugh unit. Positive relationships between Haugh unit and each of albumen weight, shell weight and albumen index but negative associated with each of traits of shell thickness. Positive phenotypic relationships were also found among traits of egg components and among traits of shell thickness and between egg weight and egg specific gravity.