

The use of artificial neural networks to explore the relationship between breeding values of egg production with other phenotypic measurements in hens of a White Leghorn population

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Artificial neural networks (ANN) are of great interest to approximate any complex functional relationship between covariates (input variables) and response variables (output variables). Multilayer perceptron (MLP) is one type of ANN that is most used to solve regression problems. It can be used to explore the relationship between breeding values of a trait with phenotypic measurements of other traits as possible predictors of the response. The objective of this research was to use MLP ANN to explore the relationship between breeding values of total egg production from 17th to 70th weeks of age with phenotypic traits related with the egg production. In a white leghorn station. The MLP is a feedforward ANN and it uses the back propagation method to training it in a supervised manner. This method is based on the error-correction learning rule. The traits measured in animals and the mean performance of traits by sire's and by dam's progenies were age at first egg, egg weight at 40 weeks of age, body weight at 62 weeks of age, mean performance of egg production rate from 30 to 70 weeks of age by sire's progeny, mean performance of age at first egg by sire's progeny, mean performance of egg weight at 40 weeks of age by sire's progeny, mean performance of body weight at 62 weeks of age by sire's progeny, mean performance of egg production rate from 30 to 70 weeks of age by dam's progeny, mean performance of age at first egg by dam's progeny and mean performance of body weight at 62 weeks of age by dam's progeny. The best architecture of MLP ANN was with 11 neurons in the input layer, 18 neurons in the hidden layer and one neuron in the output layer. The activation function of neurons in the hidden layer was the hyperbolic tangent. The correlation between breeding values and those ones predicted by MLP were of 0.96 at the training phase and 0.93 at test and validation phases. Financial Support: Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP); Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES); Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).