

Effect of genotype on human-edible protein conversion efficiency: valorisation of local chicken breeds through cross-breeding strategy

F. Volpe¹, M. Zampiga¹, R. Piscitelli¹, E. Santolini¹, M. Bovo¹, D. Torreggiani¹, P. Tassinari¹, F. Sirri¹, M. Petracci¹

¹Department of Agricultural and Food Sciences, Alma Mater Studiorum – University of Bologna, Bologna, Italy

Presenting author: federica.volpe7@unibo.it

Commercial egg production relies almost exclusively on the use of selected hen hybrids, which show higher productive efficiency than local chicken breeds but they have a scarce attitude for an efficient production of meat. In this study, a commercial laying hen hybrid (Lohmann brown, LB), two Italian local breeds (Bionda Piemontese -BP- and Robusta Maculata -RM-) and their crossbreeds with a dual-purpose genotype (Sasso -S-; BPxS and RMxS) were compared for the efficiency in human-edible protein production. The protein conversion efficiency was calculated taking into account the feed intake and the body weight of the ready-to-lay pullets at 25 wks of age as protein input, and both egg and meat as protein output. For each genotype, 60 laying hens were reared from 25 to 66 wks of age in an experimental farm under homogenous conditions and using the same 3-phase feeding program (25-51 wks, crude protein -CP- 17.8%; 52-62 wks, CP 17.0%; 63-66 wks, CP 15.8%). The protein content of the edible portion of eggs collected during the laying period as well as boneless meat obtained at the end of it was estimated to determine the effects of the genotype and to validate the effectiveness of crossbreeding strategy. On average, a protein output of 1,504 g/hen was obtained, deriving primarily from eggs (87.6%). As expected, large differences were found according to the genotype. Indeed, while LB produced 2,049 g of proteins (94.3% from eggs), local breeds and crossbreeds showed an average reduction of 971 and 392 g of protein output, respectively. In terms of protein conversion efficiency, LB presented the highest value (27.1%) and the purebreds the lowest ones (BP=17.0% and RM=17.7%), while crossbreeds showed a better efficiency than the corresponding local breed (BPxS=22.1% and RMxS=22.2%). In conclusion, the crossbreeding strategy allowed to improve human-edible protein conversion efficiency through a greater egg productivity and a slight increase in boneless meat production, contracting the gap between the purebreds and the commercial hybrid while potentially facilitating the conservation of such endangered Italian chicken breeds. A Life Cycle Assessment study conducted with a “gate-to-gate” approach including both the pullets rearing phase and the deposition cycle is ongoing to estimate the environmental impacts associated with the total production of human-edible proteins from egg and meat.

Keywords: laying hen; local breed; crossbreed; protein conversion efficiency; human edible protein; egg; meat; Life Cycle Assessment