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Replacing soybean meal by alternative protein sources: Multicriteria assessment of medium or slow-growing chicken production system

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This study aimed to assess the feasibility of producing medium (MG) or slow (SG)-growing chickens while limiting or totally removing soybean meal from the animal diets. Three feeding strategies were compared for MG production: a control (with soybean meal), a low soybean strategy (BS) and a soy-free strategy (0%S) including alternative sources of proteins. Only the control and 0%S diets were compared for SG production. MG and SG chickens of both sexes were reared up to 56 or 84 days of age, respectively. Various measurements were carried out, including growth performances, skin lesions, carcass and meat quality and mass balances. Performances of MG chickens were not affected by the BS strategy while the 0%S strategy negatively impacted slaughter weight, feed conversion ratio and breast meat yield. The 0%S strategy had no impact on final live weight and breast meat yield. Regarding environmental aspects, mass balances showed that nitrogen and phosphorus excretion rates were affected by the two alternative feeding strategies while nitrogen volatilization was reduced in the 0%S strategy. The 0%S strategy influences mainly the appearance of carcass and meat with a more pronounced yellow color. The multicriteria assessment of the MG production system showed that live weight production costs were not affected by the BS strategy while they increased by 4% in the 0%S one. Meanwhile, greenhouse gas emissions were significantly reduced in both alternative strategies (-12 and -27% respectively for BS and 0%S). For SG chickens, the live weight and breast meat production costs were little affected by the 0%S strategy (+ 1%), while greenhouse gas emissions were significantly reduced (-41%). Replacing soybean by other protein sources would thus be helpful to better meet the expectations of poultry meat consumers (non-GM feed, use of local feedstuffs...) while minimizing the negative environmental and economic impacts.

Keywords: nutrition, protein sources, multicriteria assessment, chicken