Environmental assessment of layer-type male chicks breeding

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Since 2022, due to ethical concerns, French legislation prohibited the culling of layer-type male chicks after hatching. In order to deal with this prohibition, three methods can be applied. The first one is *in ovo* sexing, resulting in the culling of male eggs before hatching. A second one is the selective breeding of layer-type male chicks. The third method is the use of dual-purpose breeds, selected for balanced performances in meat and egg productions. Since the genetic selection of current poultry breeds has led to a negative correlation between meat and egg production performances, layer-type male or male from dual-purpose breeds have variable growth performances and a different environmental impact. Thus, this study aimed to assess the environmental impact of male chicks breeding, using life cycle assessment (LCA) method from cradle to slaughterhouse. A trial was set up to evaluate the meat production performances of two different layer genetics (Lohmann Brown, H&N SuperNick White) and one dual-purpose breed (Hendrix ISA-DUAL) compared to a meat-type slow growing breed (Hubbard JA S757N) used in French 'label-rouge' production. Each genetic type was raised at two different market targets: cockerel or broiler, with an objective live-weight at slaughter of respectively 850 to 1000 g or 1,800 to 2,200 g. The results of this study were carried out through eight LCA scenarios, one for each genetic at each growth stage. The functional unit is kg of carcass weight. The indicators assessed will be climate change, land use, acidification, water use and eutrophication. Indicators will be compared for each scenario in order to quantify the environmental burden of alternatives to the culling of layer-type male chicks. The environmental impact is expected to be higher for broilers than for cockerels, with longer growth duration and higher feed conversion ratio. Breeding male chicks of layer-type has a higher environmental impact than conventional broilers. These results could help the poultry sector to find environmental, economic and technical compromises to face an ethical challenge related to the prohibition of layer-type male chicks' culling. Further environmental assessment of the couple male chicks and laying hens will be led for the layer-type and dual purpose breeds, in order to assess their global impact.

Milk metabolites differ with feed efficiency during early lactation but not during feed restriction

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The objective was to study associations among indicators of feed efficiency and selected milk metabolites during early lactation, and in response to experimental feed restriction (FR) for the discovery of non-invasive proxies. 28 cows divergent in phenotypic residual feed intake (RFI; positive or negative) were selected, each RFI group composed of 14 Holstein and 14 Montbéliarde cows. Energy balance (EB) and conversion efficiency (ECE; NE_L secreted/intake) were calculated. Early lactation RFI (RFIearlylact) was measured during the first 10 wks of lactation. Starting at 87±9 DIM, cows underwent four 4-day periods of FR to meet 50% of individual energy requirements (FR1-FR4). Mid-lactation RFI (RFImidlact) was measured during 5 wks following FR4, as described (doi.org/10.1016/j.anscip.2022.07.181). Milk isocitrate, glucose, glucose-6-phosphate, malate, glutamate and free amino groups (NH_2-groups) were measured on wk 1, 2, 3, 4, 6 and 8, and daily during FR1 only. Data was analysed using mixed models with repeated measures, and spearman correlations. RFIearlylact ranged from -0.44 to -2.39 for negative RFIearlylact (i.e. more efficient), and from 0.42 to 2.34 kg DMI/d for positive RFIearlylact groups. Early lactation ECE was higher, whereas EB, plasma glucose, milk glucose, NH_2-groups and glutamate were lower for the negative RFIearlylact group. Average early lactation milk glutamate and NH_2-groups from wk1 to 8 were correlated with RFIearlylact (r= 0.44 and 0.41), but not with RFImidlact. No milk metabolite RFI group differences were observed during FR1. Weekly EB was positively correlated with milk glucose and malate (r=0.30 and 0.32), and negatively correlated with milk isocitrate and NH_2-groups (r=-0.25 and -0.17), and the inverse correlations were observed for ECE. RFIearlylact associations with plasma glucose, milk glucose, NH_2-groups and glutamate during early lactation may reflect in prioritization of nutrients towards milk secretion in more efficient cows. Conversely, these effects may be due to the lower EB experienced by cows with negative RFIearlylact.