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Eliel González García, Marcelo Gindri, Laurence Puillet, Nicolas N.C. Friggens

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Individual adaptive responses of meat ewes facing an abrupt nutritional challenge after lambing

E. González-García[1], M. Gindri[2], L. Puillet[2] and N.C. Friggens[2]

[1]INRAE, PHASE, SELMET, Univ Montpellier, CIRAD, INRAE, L'Institut Agro Montpellier SupAgro, 34060 Montpellier, France, [2]INRAE, PHASE, Université Paris-Saclay, INRAE, AgroParisTech, UMR MoSAR, 75005, Paris, France;

eliel.gonzalez-garcia@inrae.fr

Simulating a climate change event, responses of Mediterranean meat ewes when facing an abrupt nutritional challenge (**NC**; i.e. fed with cereal straw of very low nutritional value only) were studied at a very sensitive physiological stage (i.e. just after lambing). Forty Romane ewes were chosen at early-mid pregnancy (around 2 mo) according to parity (20 primiparous, **PRIM**; 20 multiparous, **MULT**); feed efficiency genetic line [residual feed intake (**RFI**); inefficient, RFI-, n= 10 per parity; efficient, RFI+, n= 10 per parity); litter size (i.e. bearing twins, diagnosed by ultrasonography); and **BW** and body condition score (**BCS**) [initial **BW** and BCS (mean ±SD): 51.6±7.41 kg; 2.5±0.20, respectively; representing average BW and BCS of their parity in the flock]. Effects on intake, ewes' BW and BCS, subcutaneous back-fat thickness (**BFT**), energy metabolism [plasma **NEFA**, β-**OHB**, glucose, urea, tri-iodothyronine (**T3**)], and lambs' growth were examined before, during and after NC. Individuals' profiles of the response-recovery of each ewe to NC were described using a piecewise mixed-effects model and clustered using principal components analysis and Euclidean distance. MULT presented sharper β-OHB recovery from NC than PRIM ($P \leq 0.05$). Parity or genetic line did not affect the other evaluated traits. Clusters of individuals' response-recovery to NC suggested three different adaptive strategies to NC (i.e. adaptation on acquisition, allocation or trade-off between acquisition and allocation of energy. Interestingly, ewes' response-recovery to NC demonstrated also to be related to lamb average daily gain (**ADG**, g/d), especially plasma β-OHB and NEFA ($r \geq 0.50$). Results provide new insights in how such short and abrupt NC affect some key physiological parameters, and to what extent the impacts of NC and the ewes' potential response-recovery are influenced by the individual nature of the animals (i.e. observed inter-individual differences in the responses). This work was financed by the PRIMA ADAPTHERD project (https://www.adapt-herd.eu/).