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Resilience to underfeeding in dairy ewes diverging in feed efficiency: rumen fermentation

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Sheep are traditionally well adapted to less-favoured environments. However, selection of high-performance breeds may have impaired their intrinsic resistance and resilience, which may compromise the response of dairy flocks to future challenges. Re-focusing breeding towards improved feed efficiency (FE) is expected, but no information seems to be available about the relationship between FE and resilience in dairy ewes. Because recent data suggest a key role of rumen function in FE in the ovine, a trial was conducted to compare ruminal fermentation patterns in lactating sheep phenotypically divergent for FE and subjected to a severe nutritional challenge. Daily intake and performance were recorded for 3 weeks in 40 Assaf ewes to estimate their FE (calculated as the difference between the actual and predicted intake estimated through net energy requirements for maintenance, production and weight change). Then, the feeding of the highest (H-FE) and the lowest (L-FE) feed efficiency ewes (n=10/group) was restricted only to straw for 3 days. Ruminal fluid was collected before, during and 10 days after the challenge, using a stomach tube, to examine fermentation characteristics. Concentrations of total volatile fatty acid (VFA) were lower in H-FE than L-FE, but no difference among groups were found for pH, ammonia concentration or molar proportions of VFA. As expected, the challenge increased rumen pH, and decreased ammonia and total VFA concentrations, but initial values were reached in the recovery period. Concerning molar proportions, propionate remained unaffected by undernourishment, butyrate was reduced, and acetate and minor VFA were increased. These proportions did not recover their initial value on day 10 after the challenge. In any event, no differences in temporal patterns of variation in ruminal fermentation were detected between H-FE and L-FE, which seems consistent with the similar impact of and recovery from the challenge in terms of milk production and composition. Overall, results suggest a similar resilience in sheep divergent for FE. Acknowledgements: project PID2020-113441RB-I00, MCIN/AEI; grant PRE2018-086174, MCIU/AEI/FSE, EU.

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Poster 18

Genome-wide association study for gastrointestinal nematode parasite resistance in Santa Inês sheep

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Gastrointestinal nematode infection is the most important cause of economic loss in sheep production. The inappropriate use of anthelmintics is increasing the resistance of gastrointestinal parasites, enforcing the search for sustainable alternatives of control. The aim of this study was to identify genomic regions associated with resistance to gastrointestinal endoparasites traits, such as, egg per gram of faeces (EPGlog), packed cell volume (PCV), degree of anaemia assessed by Famacha® score (FAM) and total plasma protein (TPP). The phenotypic data included 6,564 records collected from 1,725 Santa Inês animals. A total of 638 animals were genotyped with the Ovine SNP50 Genotyping BeadChip (Illumina, Inc.). Markers with unknown genomic position, located on sex chromosomes, with minor allele frequency <0.05, and call rate <90% were excluded. The variance components were estimated using a single animal trait model by Bayesian inference. For all studied traits, the fixed effects considered in the model were contemporary groups (farm, year and season of phenotype collection), sex and aged at the phenotype collection. The heritabilities estimated for EPGlog, PCV, FAM and TPP was 0.09, 0.27, 0.20, and 0.32 for EPGlog, PCV, FAM, and TPP, respectively. The single step GWAS identified 17, 19, 21 and 22 genomic regions explaining more than 1% of the additive genetic variance for EPGlog (57.9%), PCV (41.6%), FAM (32.9%) and TPP (61.1%), respectively. Those regions harbour important genes related with immune system functions, which could potentially benefit sheep breeding programs. Financial support: São Paulo Research Foundation (FAPESP) grant 2016/14522-7 and scholarship 2020/15760-4. C.C.P. Paz was the recipient of a productivity research fellowship from CNPq.