Perspective

iMedPub Journals
www.imedpub.com

Journal of Animal Research and Nutrition

2023
Vol.8 No.1:068

Brief Note on Multiple Correspondence Analyses of Animals

Kuraz Tesfaye*

Department of Animal Science, Werabe University, Werabe, Ethiopia

***Corresponding author:** Kuraz Tesfaye, Department of Animal Science, Werabe University, Werabe, Ethiopia, E-mail: tesfaye_k@gmail.com

Received date: January 11, 2023, Manuscript No. IPJARN-23-16004; **Editor assigned date:** January 13, 2023, PreQC No. IPJARN-23-16004 (PQ); **Reviewed date:** January 24, 2023, QC No. IPJARN-23-16004; **Revised date:** February 04, 2023, Manuscript No. IPJARN-23-16004 (R); **Published date:** February 11, 2023, DOI: 10.36648/2572-5459.8.1.068

Citation: Tesfaye K (2023) Brief Note on Multiple Correspondence Analyses of Animals. J Anim Res Nutr Vol. 8 No1: 068

Description

The aim of this study is built in two phases: to quantify the ability of novel milk metabolites to measure between-animal variability in response and recovery profiles to a short-term nutritional challenge, then to derive a resilience index from the relationship between these individual variations. At two different stages of lactation, sixteen lactating dairy goats were exposed to a 2-d underfeeding challenge. The first challenge was in late lactation, and the second was carried out on the same goats early in the following lactation.

Multiple Correspondence Analyses

During the entire experiment period, samples were taken at each milking for milk metabolite measures. For each metabolite, the response profile of each goat was characterised using a piecewise model for describing the dynamic pattern of response and recovery profiles after the challenge relative to the start of the nutritional challenge. Cluster Analysis identified three types of response/recovery profiles per metabolite. Using cluster membership, Multiple Correspondence Analyses (MCAs) were performed to further characterise response profile types across animals and metabolites. This MCA analysis identified three groups of animals. Further, discriminant path analysis was able to separate these groups of multivariate response/recovery profile type based on threshold levels of three milk metabolites: β-hydroxybutyrate, free glucose and uric acid. Further analyses were done to explore the possibility of developing an index of resilience from milk metabolite measures. Different types of performance response to short-term nutritional challenge can be distinguished using multivariate analyses of a panel of milk metabolites.

As a consequence of climate change, the scarcity of feed resources and the concomitant pressures of achieving global food security, livestock systems will be increasingly exposed to environmental perturbations. Thus, there is a need for livestock with improved resilience, the capacity of an animal to adapt favourably to environmental disturbances. In this context, resilience (not to be confused with animal robustness that combines high production potential with resilience to external stressors, here described as the pattern of response to and recovery from a perturbation, is an increasingly important characteristic on farmed animal. Indeed, recent studies have shown that there is a correlation between the degree of perturbation of milk yield curves through lactation and frequencies of health events such as mastitis and ketosis, as well as with productive longevity.

Milk LDH concentrations are generally related to mammary infections. In goats, LDH is a reliable biomarker of udder inflammatory processes but parity and lactation stage might influence its concentration. As the challenge applied in the present study was nutritional, it was not expected to impact udder health status directly. However also found an increased LDH milk concentration in cows with physiological imbalance. Two scenarios are possible: the first is a local up regulation of LDH synthesis in order to increase ATP flux from Glucose as LDH is a common enzyme found in all glycolytic pathways. The second is that feed restriction induced increases in permeability of mammary cell junctions allowing more plasmatic LDH to flow to mammary gland.

However, resilience is difficult to measure. This is in part because it involves capturing dynamic features, such as rates of response and recovery from a perturbation, and that requires high-frequency repeated measures. It is also in large part because the full response to a perturbation is expressed across multiple measures and thus requires a multivariate approach to better characterise resilience clearly showed the multivariate nature of resilience across physiological and behavioural responses in rainbow trout. They also showed that there was variability between animals in the relative weight of the different components within the overall response to perturbation. Similar results have been found in a ruminant, which has led to the notion of multivariate indexes for describing animal health status. However, to date, appropriate methodologies for sequentially filtering, combining, and then extracting the key information from multiple measures of response/recovery remain to be clearly described in the livestock domain.

Animals and Challenge Design

Milk metabolite measures are attractive candidates for an improved phenotyping of resilience as the requisite samples can be readily obtained on-farm, are non-invasive, and could be integrated into automated on-farm biomarker systems, examples of which have been commercialised. Accordingly, the aim of this study was to quantify the ability of milk metabolite measures to capture variability in the response and recovery

profiles to a short-term nutritional challenge by applying multivariate statistical methods to profile shapes. Finally, this study explores the possibility of developing an index of resilience from milk metabolite measures.

Exploratory analysis to construct a response profiles index was carried out using as a basis the two first dimensions of the MCA, from the milk metabolite profiles. This index combines the multivariate responses of the different milk metabolites into one measure. The first step was to fit the overall trend of the relationship between the first two axes using a cubic spline. Thereafter, the response profiles index was calculated by multiplying the fitted values obtained by the smoothing spline and the eigenvalues percentage of variance of each axis. In order to simplify the scale, and for convenience, it was linearly transformed into a 0–10 range. To be able to interpret this index, the performance profile categories were projected in the same planes as supplementary variables.