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113 What drives the response of beef cows to short periods of undernutrition? - Sponsored by EAAP.

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Abstract: In extensive beef cattle production systems, limited feed quality or availability can lead to nutrient restrictions either in the short- or the long-term. Cows may respond differently depending on the stage of lactation or the frequency and duration of undernutrition. We studied the response of lactating beef cows (n = 31) to short nutrient restriction challenges, staggered across different stages of lactation or in quick succession (three consecutive challenges). All cows received a single diet calculated for the average cow [615 kg body weight (BW), 8.5 kg/d milk yield]: 100% requirements during 4 d [d -4 to d -1, basal period), 55% requirements on the next 4 d (d 0 to d 3, restriction period) and 100% requirements for 4 d (d 4 to d 7, refeeding period). During the basal and refeeding periods, cows received 8 kg hay + 3 kg concentrate while during restriction they received only 7 kg hay. The experimental design was repeated in mo 2, 3 and 4 of lactation, and additionally in mo 4 we applied three consecutive challenges, each consisting of a 4-d feed restriction followed by a 3-d refeeding period. We modelled the individual response curves to diet changes for milk yield (MY), plasma non-esterified fatty acids (NEFA) and β-hydroxybutyrate (BHB) concentrations. Based on these curves we clustered cows into two groups differing in their metabolic response (MR): High and Low MR cows. Then we compared the response of both MR clusters with advancing lactation or in response to three successive challenges. Basal values of MY, NEFA and BHB decreased as lactation advanced, indicating a lower metabolic load. The High MR cows had greater basal values for all traits and a more intense response to feed restriction in terms of reduction of MY and increase of NEFA and BHB, but cows in both MR clusters showed similar reaction times. Since their BW and condition score were similar, the response appeared to be driven by the milk potential of the cow rather than by their size or body reserves. When subjected to successive challenges in mo 4, the High MR cows showed a faster and stronger response to diet changes than the Low MR cows (Figure 1). The NEFA response to restriction diminished with the consecutive iterations, resulting in an increased milk loss as compared with the pre-challenge yield. This implies that the habituation of the body lipid metabolism led to

a sensitization of MY to repeated underfeeding. Cows of both MR clusters recovered baseline values during refeeding, which suggests that they were able to activate metabolic pathways to respond to and recover from the challenge. The strategies adopted by beef cows to cope with undernutrition changed as lactation progressed and also in response to reiterated feeding restrictions.

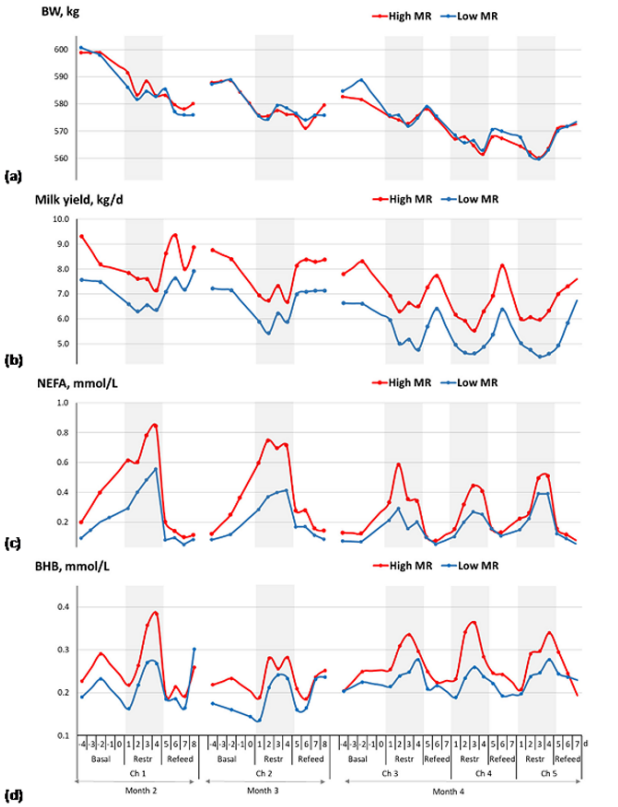

Figure 1. Performance and plasma metabolites of beef cows in response to diet changes with advancing lactation (months 2, 3 and 4) or in consecutive challenges (month 4) according to the metabolic response (MR) cluster (High vs. Low MR): (a) Body weight (BW), (b) Milk Yield, (c) plasma non-esterified fatty acids (NEFA), (d) plasma β-hydroxybutyrate (BHB)

Keywords: beef cattle, milk yield, non-esterified fatty acids, undernutrition