Results

## Multi-choice feeding trials

In multi-choice trials, snowshoe hares ate an average of 58.4 ± 5.1 g DM/kg^0.75/day across all diets. There was a significant effect of diet on DMI (P = 0.01). DMI of Diet B was 2.9 times that of Diet A (p = 0.01) and 2 times that of Diet D (P = 0.06; Figure 2A). DMIs across all diets during the multi-choice experiment translated to average crude intakes of 6.4 ± 0.8 g DM/kg^0.75/day of CP and 1074.7 ± 94.4 kJ/kg^0.75/day of GE (Figure 2C). Average digestible intakes were 4.3 ± 0.6 g DM/kg^0.75/day of DP and 581.8 ± 54.6 kJ/kg^0.75/day of DE (Figure 2E). When plotted in nutritional space, the target intakes of CP and GE and DP and DP fell between the nutritional rails of Diets B and C (Figure 2E, 2F).

## No-choice feeding trials: feeding responses

Hares ate 93.6± 3.2 g DM/kg^0.75/day of feed across all diets. The DMI for Diet A was significantly higher than all other diets (P < 0.001), whereas there was no difference between diets B, C, and D (Figure 2B). The greatest difference was between Diet A and C, with hares eating 1.27 times more of A than C (Figure 2B). In terms of CP and GE, no-choice intake rates curve away from the target intake rate, appearing as though on diets A and B hares aim to meet a minimum protein intake, while aiming to meet a minimum energy intake on diets C and D (Figure 2D). After converting intake rates to DP and DE, the feeding pattern changed considerably, showing hares to meet a certain energy intake (~ 900 kJ DP/kg^0.75/day) regardless of protein (Figure 2F). On Diet A, hares could not achieve the DE intake of the other diets nor the target intake of DP observed in multi-choice trials (Figure 2F).

## No-choice feeding trials: weight change and digestive responses

Diet affected hare weight change at the end of 3-day feeding trials (P = 3^{-4}; Figure 3). Diet A caused the greatest weight loss (median = -1.2 %/day). Diet B resulted in a slight weight increase with a median of 0.2 %/day (Figure 3). There was no difference in hare weight change when fed Diets B, C or D (Figure 3).

Based on fecal composition and quantity, diet dry matter digestibility differed across diets. Diet D was the most digestible and Diet A was the least (P < 0.001; Figure 4A). Diet A had significantly lower digestibility than all other diets (P < 0.001), and Diet B was also significantly less digestible than diet D (P < 0.01; Figure 4A). CP digestibility increased significantly as diet CP increased from A to D (P < 0.001; Figure 4B). Diet D had 1.85 times greater protein digestibility than Diet A.

In terms of GE (x-axis) and CP (y-axis), hares generally were able to maintain their weight when protein intake reached or exceeded approximately 9 g DM/kg0.75/day, but only when coincident with low and mid ranges of GE intake, such as occurred between the rails of diets B, C, and D. Once GE intake surpassed ~ 2000 kJ/kg0.75/day, weight loss occurred regardless of protein intake. This indicates that hares experience greater protein limitation than energy limitation (Figure 5A; rsq = 0.3 ; deviation explained = 0.37). The GAM associated with this surface map showed CP intake to have a significant, non-linear effect on weight change (Table 2). The surface map for DE and DP intake revealed one area in the centre of the plot, between Diets B and C, where hares were able to maintain their weight, and this also occurred at the highest levels of DP intake, as exemplified by the highest intakes on Diet D (Figure 5D). The GAM for this map showed DP intake had a significant, non-linear effect on hare weight change (rsq = 0.35 ; deviation explained = 0.42; Table 2).

Based on linear regressions, our feeding trials estimated that hares require 1100 kJ/kg^0.75 of DE, 14 g DM/kg^0.75 of CP, and 12 g DM/kg^0.75 of DP per day to maintain body weight (Figure 6). The relationship between GE intake and weight change was non-significant (P = 0.48).