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### Changes in dairy cow body weight and milk yield due to diet change

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Diet changes may have large effects on body weight (BW). This study aimed to quantify the effect of diet change between summer grass and TMR on dairy cow BW and milk yield (MY) in comparison with cows housed and fed TMR all year-around. Data from 2009 and 2010 were obtained from SRUC (Crichton Royal Farm, Dumfries, UK). Cows calved continuously throughout the year, were milked 3 times daily and were weighed automatically after each milking. Diet was either grazing during the summer and feeding on TMR when housed (Grass/TMR), or always feeding on TMR (Control). In each year, the Grass/TMR group had a diet change from TMR to grass and one from grass to TMR, these were gradual during one week per milking window and cows had access to TMR part of the day. Data from day 1 to 305 in milk were used, and outliers deviating more than 50 kg from the mean of the previous two observations in a lactation were removed. After cleaning, 192 periods (coming from 157 lactations made by 140 cows) from 30 days before to 30 days after each grass event were selected, and the equivalent periods for Control cows. To minimize the influence of meal-related gutfill, BW were smoothed by quantile regression using the 20% lower quantile. The difference in MY and smoothed BW 20 days before and after 20 days after a diet change were calculated and tested in a mixed model:  $Y = \text{diet} + \text{season} + \text{year} + \text{parity} + \text{merit} + \text{diet} \times \text{season} \times \text{year} \times \text{merit}$ , with cow as random effect. Non-significant interactions were removed stepwise. Results showed that Control cows gained weight regardless the season, whereas Grass/TMR cows lost weight at turn-out but gained weight at turn-in (Chi<sup>2</sup>= 114; P<0.001), see Table 1. Further, Control cows reduced MY in autumn, whereas Grass/TMR cows reduced MY at turn-out (Chi<sup>2</sup>=4.55; P=0.03). Overall, cows that did not experience any diet change gained 24 kg, whereas cows that went to summer grass gained less than 1 kg, a diet effect of 23 kg BW, even though BW were adjusted for meal-related gutfill.

Table 1: Body weight and milk yield changes by diet and season.

	Diet	
	Control	Grass/TMR
<b>Body weight change, kg</b>		
Spring: TMR to grass	15.6	-18.2
Autumn: Grass to TMR	8.4	18.9
<b>Milk yield change, kg</b>		
Spring: TMR to grass	-0.16	-0.59
Autumn: Grass to TMR	-2.26	-0.03