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BRIEF COMMUNICATION: The effect of milk allowance on performance of dairy calvesK Rosenberger^{a,b}, JHC Costa^a, HW Neave^{*a}, MAG von Keyserlingk^a and DM Weary^a^a *Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, 2357 Mall, Vancouver, B.C. V6T 1Z4, Canada;* ^b *Department of Farm Animals and Veterinary Public Health, Institute of Animal Husbandry and Welfare, University of Veterinary Medicine, Veterinärplatz 1, 1210 Wien, Austria*^{*}*Corresponding author.* Email: hwneave@gmail.com**Keywords:** neonatal growth; calf nutrition; automated feeding systems; high plane; nutrition**Introduction**

Restricted milk diets increase and hasten the onset of solid feed intake in milk-fed calves (de Passillé et al., 2011) and facilitate the weaning of calves, which reduces the growth check during weaning in comparison to *ad libitum* fed calves (Huuskonen & Khalili, 2008). As a consequence, dairy calves are commonly fed a restricted milk allowance of approximately 10% of a calf's BW (approximately 4 to 6 L of milk/d; e.g. Vasseur et al., 2012). However, calves fed a restricted amount of milk (10% of BW) show increased behavioural signs of hunger like non-nutritive visits to the milk feeder (Rushen & de Passillé, 1995) and less growth pre-weaning when compared with calves fed more milk (Khan et al., 2007). Indeed, a growing body of research has consistently shown that calves fed more milk exhibit greater BW gains before weaning (see review by Khan et al., 2011).

The aim of this study was to identify the effect of feeding 6 or 12 L/d of milk on average daily gain (ADG) and final body weight (BW) after weaning when using a gradual, step-down weaning method.

Materials and methods

This study was conducted at the UBC Dairy Education and Research Centre in Agassiz, BC, Canada, and was approved under the UBC Animal Care protocol # A14-0245 and was part of a larger study (see Rosenberger et al., submitted). Twenty-eight Holstein calves were divided randomly by date of birth into each of the seven groups. The calves were randomly assigned to either 6 or 12 L/d of pasteurized whole milk. Milk was reduced to 50% of the allowance from d 42 to d 49 of age and reduced by 20% per day for the last five days until calves were completely weaned at d 55 of age. Calves were also given *ad libitum* access to textured calf starter (containing on an as fed basis: 57.5% concentrate pellets, 14% rolled barley, 13% rolled oats, 10% steam-rolled corn, and 3.5% molasses), grass hay (tall fescue × ryegrass cross, orchard grass and ryegrass) and water. Calves were weighed and health checked weekly. Average daily gain (ADG) over the full experimental period (d 7 to d 68) and final BW after weaning (d 68) were recorded and analyzed using the MIXED procedure in SAS for the effect of milk allowance with the fixed effects of treatment and birth weight, and group specified as a random effect.

Results and discussion

As shown in previous studies (Morrison et al., 2012) calves fed 12 L of milk achieved greater ADG (6 L: 0.82 ± 0.04 vs 12 L: 0.93 ± 0.03 ; $P=0.02$) and final body weights at d 68 post-weaning (6 L: 98.77 ± 2.54 kg vs 12 L: 105.25 ± 2.32 kg; $P=0.03$) compared to calves fed 6 L of milk over the full experimental period. We did not observe growth checks at weaning; likely a consequence of the step-down weaning first described by Khan et al. (2007).

Our results indicate that providing a higher milk allowance for calves, together with a gradual weaning over the course of 12 days using a step-down procedure, achieves higher ADG and higher post-weaning weights.

Acknowledgements

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