Effect of differing forages on the early growth and behaviour development of dairy heifers during pre- and post weaning periods

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Zaka Ullah

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Abstract

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The objective of this study was to evaluate the effects of different forage diets fed to young calves on early growth, behaviour development and long term milk performance. In experiment 1, 60 calves were randomly allocated to one of three diets, fed starter diet with no forage (PS), PS with additional moist alfalfa (PSA) or PS with additional pasture hay (PSH). In experiment 2, 108 calves were randomly allocated to one of three diets, PSH, PS with low (LF) or high (HF) moist alfalfa based total mixed rations. In Experiment 1, greater dry matter intake and liveweights were observed in PSH followed by PSA and then PS during the pre- and post-weaning periods. Longer time eating and ruminating behaviours were observed in PSA and PSH than PS during pre- and post-weaning periods. In Experiment 2, greater dry matter intake and liveweights were observed in PSH than LF and HF diets during the pre- and post-weaning periods. Greater numbers of incidents of allo-grooming were observed in the HF and PSH diets and calves spent longer time eating than LF calves. During post-weaning period, HF and PSH fed calves spent more time lying than LF fed calves. After turning out to pasture, no behaviour differences were observed among treatments in both experiments. While monitoring long term performance, no differences were observed in animals from Experiment 1 in terms of liveweight, milk yield, protein or fat production. From Experiment 2, greater liveweight gains were observed in HF and PSH fed animals than LF fed animals till first lactation. During first lactation, greater milk yield was observed in HF fed animals than PSH or LF fed animals. Greater fat production was observed in LF fed animals than HF or PSH fed animals during third lactation. The effects of diets on the long term performance of the animals should be repeated with sufficient animal numbers per treatment.

Declaration

This thesis contains no material that has been accepted for a degree or diploma by the University or any other institution. To the best of my knowledge no material previously published or written by another person has been used, except where due acknowledgement has been made in text.

This thesis has been written with chapters formatted as papers for publication. Therefore, there is some repetition of chapter introductions or methods, each chapter contains a full discussion, with the final general discussion chapter providing a succinct discussion of key findings of this thesis. Each chapter has been formatted for the Journal of Dairy Science and each has a complete list of references. For each of the chapters my input was the greatest with the appropriate assistance of my co-supervisors, I designed and carried out the research, analysed the data and wrote the main content of the chapters contained in this thesis.

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ADF: Acid detergent fibre (%DM)
ADG: Average daily gain for animal at a given age (g or kg/day)
CP: Crude protein (%DM)
DE: Digestible energy (Mcal)
DIM: Days in milk
DM: Dry matter
DMI: Dry matter intake (kg/day)
FCE: Feed conversion efficiency
HF: High fibre
HH: Hip height
HW: Hip width
LF: Low fibre
LRG: Last rib girth
LWT: liveweight
ME: Metabolizable energy
MR: Milk replacer
MUEC: Massey University Ethics Committee
MW: Mature weight (kg)
NDF: Neutral detergent fibre (%DM)
PSH: Starter and pasture hay
PW: Production Worth
TDN: Total digestible nutrients (% DM)
TMR: Total mixed ration
WM: Whole milk
VFA: Volatile fatty acid