

Modelling enteric methane abatement from earlier mating of dairy heifers in subtropical Australia by improving diet quality

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Case studies of three dairy farms

Age at first mating and calving data were obtained from three farms within the sub-tropical dairying region of northern New South Wales and southern Queensland, Australia. This region was selected because it has traditionally had the highest age at first calving across the eastern seaboard of Australia (Hough, 1992). We selected three farms as representative of one of three alternative heifer-raising systems.

- *Case study farm 1- Dryland tropical pastures and minimal concentrates (Gympie, QLD; 26.2°S, 152.7°E)*

The ME concentration of the diet was estimated at 9 MJ/kg DM over the duration between weaning and mating (Trevaskis, unpub. data. 2014). Between weaning at 3 months of age and 12 months of age, heifers grazed rainfed C₄ pastures (predominantly *Setaria (Setaria anceps)* with some Bisset Bluegrass (*Bothriochloa insculpta*) and Kikuyu (*Pennisetum clandestinum*); c. 8-9 MJ ME/kg DM). Heifers were fed concentrates (c. 12.0 MJ ME/kg DM) at a rate of 1 kg DM/head.day. Heifers also grazed annual ryegrass (*Lolium rigidum*) (c 11.5 MJ ME/kg DM) over winter when the dairy farm had surplus annual ryegrass pastures to milker requirements. Between 12 months of age and mating at 23 months of age, heifers grazed the same pasture species as mentioned above with concentrate feeding of 1.7 kg DM/head.day.

- *Case study farm 2- Supplements and grazing (Casino, NSW; 28.8°S, 153.0°E)*

The ME concentration of the diet was estimated at 11 MJ/kg DM over the duration between weaning and mating (Trevaskis, unpub. data. 2014). Between weaning at 3 months of age and 9 months of age, the heifers were fed perennial ryegrass (*Lolium perenne*) silage (9.5 MJ ME/kg DM) and *ad libitum* concentrates containing 90% triticale and 10% canola meal (c 13.2 MJ ME/kg DM). Between 9 and 14 months of age, heifers grazed annual ryegrass (c 10-

12 MJ ME/kg DM) or setaria (*c* 10 MJ ME/kg DM) and received 2.2 kg DM concentrate/head.day. Between 14 months of age and mating at 17.5 months of age, heifers grazed either annual ryegrass or setaria and received no concentrates.

- *Case study farm 3- Grazed pastures and supplementary feeding (Gympie, QLD; 26.2°S, 152.7°E)*

The ME concentration of the diet was estimated at 11 MJ/kg DM over the duration between weaning and mating (Trevaskis, unpub. data. 2014). Between weaning at 3 months of age and 6 months of age, heifers grazed rain-fed kikuyu (*c* 10 MJ ME/kg DM) and were fed *ad libitum* hay (*c* 8 MJ ME/kg DM) and calf-pellet mix at a rate of 2 kg DM/head.day (*c* 12.5 MJ ME). Between 6 months of age and mating at 17 months of age, heifers grazed rain-fed kikuyu and had *ad libitum* access to a heifer mix which was predominantly palm kernel extract (*c* 11 MJ ME/kg DM).