

## Puberty in north-Australian tropically-adapted beef heifers

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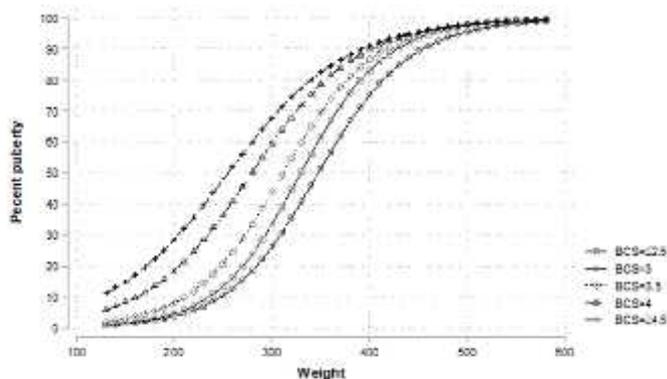
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Heifers reaching puberty by ideal mating time will have higher productivity. Variation in time at puberty has not been defined in north Australian commercial beef herds where more than half the cattle are continuously mated, a high proportion graze in low-annual growth environments (~120 kg average; McGowan et al. 2014) and there is considerable variation in breed. Reflecting this, two-thirds of heifer groups in low-growth situations and one quarter of heifer groups in higher-growth environments have pregnancy rates at or less than 75% across both yearling and two-year mating systems (McGowan et al. 2014). The hypothesis is that puberty is significantly influenced by heifer live weight.

Data on 18,967 tropically-adapted beef heifers from 51 businesses across all the major land types and representing a large range of breeds, was used to define non-genetic risk factors for puberty in north-Australian beef herds. On each property, 1-3 management groups were assessed from the 2016 to 2018 year groups. Heifers were assessed once at 1.0-2.5 years of age when an average of 48% had reached puberty. Puberty was confirmed by the presence of a *corpus luteum* on either ovary or by being diagnosed pregnant by manual palpation or ultrasound. Further measures included live weight, hip height, body condition score (animal-level), country type, site x year x age x management group, average cohort age, and average Brahman percentage (cohort-level). Multi-variable logistic regression modelling was used to analyse the risk of puberty.

Though average weight at puberty was  $\sim 320 \pm 80$  kg, variation between herds (explaining more variation than all other effects), thus target mating weights, varied by over 200 kg ( $P < 0.001$ ). In an average herd, heifers need to weigh 400 kg before at least 90% will reach puberty. Available evidence suggested a significant genetic contribution to the variation. Variation within Brahman content was five times that due to Brahman content, a non-significant effect. Better body condition was associated with increased percent pubertal by a maximum of ~35% at 300 kg ( $P < 0.001$ ; Figure 1). Taller heifers had a lower probability of being pubertal, with this effect peaking at ~15% at 350-400 kg ( $P < 0.001$ ); this may have partially overlapped with the trend for a lower percentage pubertal with higher Brahman content. Though pre-pubertal development is primarily dependent on growth, it is not completely independent of age, with a maximum effect at ~350 kg of ~2% more heifers at puberty per month of age ( $P < 0.001$ ).



**Figure 1. The interactive effect of body condition score (BCS) and live weight (kg) on reaching puberty in north Australian beef heifers**

The major conclusion is that live weight and herd are the primary predictors of puberty, with smaller effects of body condition, age, height and breed. Situation analysis of individual herds to define future target mating weight is recommended; use of published breed-specific target weights is inappropriate and not recommended.

### References

McGowan MR, McCosker K, Fordyce G, Smith DR, O'Rourke PK, Perkins N, Barnes T, Marquet L, Morton J, Newsome T, Menzies D, Burns BM, Jephcott S. (2014) Final Report, Project B.NBP.0382, Meat and Livestock Australia, Sydney.

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