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Asian Australas. J. Anim. Sci > Volume 28(1); 2015 > Article  
**Article**

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## Effect of Heifer Frame Score on Growth, Fertility, and Economics

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### Abstract

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A non-traditional forage-based protocol was employed to evaluate replacement heifer growth, fertility, and economics between small frame (SF, 3.50; n = 50) and large frame (LF, 5.56; n = 50) heifers using three increasing gain growth phases. Preceding an 85 d growing-breeding period (Phase 3; P3) the heifers were managed as a common group for Phases 1 and 2 (P1 and P2). During P1, heifers grazed common fields of unharvested corn and corn residue (total digestible nutrients [TDN] 56%) with supplemental hay. For P2, heifers grazed early spring crested wheatgrass pasture (CWG; TDN 62%) that was followed by the final P3 drylot growing and breeding period (TDN 68%). Small frame heifers were lighter at the end of P1 in May and at the start of P3 breeding in August (p = 0.0002). Percent of mature body weight (BW) at the end of P1 (209 d) was 48.7% and 46.8%, respectively, for the SF and LF heifers and the percent pubertal was lower for SF than for LF heifers (18.0% vs 40.0%; p = 0.02). At breeding initiation (P3), the percentage of mature BW was 57.8 and 57.2 and the percentage pubertal was 90.0 and 96.0 (p = 0.07) for the SF and LF heifers, respectively; a 5-fold increase for SF heifers. Breeding cycle pregnancy on days 21, 42, and 63, and total percent pregnant did not differ (p>0.10). In drylot, SF heifer dry matter intake (DMI) was 20.1% less (p = 0.001) and feed cost/d was 20.3% lower (p = 0.001), but feed cost/kg of gain did not differ between SF and LF heifers (p = 0.41). Economically important live animal measurements for muscling were measured in May and at the end of the study in October. SF heifers had greater *L. dorsi* muscle area per unit of BW than LF heifers (p = 0.03). Small frame heifer value was lower at weaning (p = 0.005) and the non-pregnant ending heifer value was lower for SF heifers than for the LF heifers (p = 0.005). However, the total development cost was lower for SF heifers (p = 0.001) and the net cost per pregnant heifer, after accounting for the sale of non-pregnant heifers, was lower for SF heifers (p = 0.004). These data suggest that high breeding efficiency can be attained among March-April born SF and LF virgin heifers when transitioned to a more favorable May-June calving period through the strategic use of grazed and harvested forages resulting in a lower net cost per pregnant SF heifer.

**Keywords:** Beef Heifer, Heifer Production Economics, Fertility, Frame Score, Increasing Energy Management, Percent Mature Body Weight

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