

**Effect of nutrition in early life on the development and performance of beef heifers**

*I. Casasús, J.A. Rodríguez-Sánchez, J. Ferrer, A. Noya and A. Sanz*

*Centro de Investigación y Tecnología Agroalimentaria de Aragón (CITA) – IA2 (CITA-UniZar), Avda Montañana 930, 50059, Spain; [icasasus@cita-aragon.es](mailto:icasasus@cita-aragon.es)*

Advancing the age at first calving of beef cows has been proposed as a strategy to increase lifetime productivity. Heifer nutrition in early life, known to affect growth and physiological development, can be compromised in extensive production systems, due to large seasonal variations in feed quality and availability. A series of experiments were carried out to determine how different planes of nutrition in the early pregnancy and in the pre- and the post-weaning phase influenced the metabolic and endocrine status, linear body measurements and the productive and reproductive performance of beef heifers with a target age at calving of 2 years. The maternal undernutrition of beef cows (65% vs 100% energy requirements) in the first 3 months of pregnancy resulted in a less mature hematopoietic system of their calves at birth and lower IGF-1 and gains during lactation. Heifers born to dams on the 65% diets had impaired metabolic status and lower follicle counts around puberty, but they did not differ in age or weight at puberty, fertility or the performance of their calves in their first lactation (age at calving: 26 months). Another study analysed the effects of feeding strategies targeting a high (1 kg/d) or low gain (0.7 kg/d) during the lactation (0-6 months) and the rearing phase (6-15 months). Heifers reached puberty at a similar weight but different age, which was associated to their growth rates and metabolic status (IGF-1, glucose, cholesterol). A consistently low gain (0.7 kg/d) from 0 to 15 months resulted in lighter weight, body size and pelvic area at calving (26 months), and higher calving assistance rates. Heifer feeding treatments did not affect their milk yield or the gains of their calves, but a genome wide expression profiling in the mammary gland showed an upregulation of genes related to the immune response in heifers on high nutrition planes during lactation, consistent with an increased somatic cell count. Apart from the economic aspects related to feeding costs in the different phases, the final decision on heifer management should also be driven by its potential impact on cow performance beyond this first lactation, which remains to be determined.

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