Periconceptional body condition induces placental adaptations but does not affect foal growth and metabolism in horses

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PERICONCEPTIONAL BODY CONDITION INDUCES PLACENTAL ADAPTATIONS BUT DOES NOT AFFECT FOAL GROWTH AND METABOLISM IN HORSES

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Objectives: It has been shown in several species that the periconceptional environment can affect offspring long-term phenotype. This study aims to investigate the effects of periconceptional body condition on feto-placental biometry, post-natal foal growth and glucose metabolism.

Materials and methods: 32 saddlebred mares of similar size were allocated to one of two groups depending on their body condition score (BCS, 1-5 French scale) at the time of artificial insemination (AI). Group High (H, n=18) had a median BCS of 3.9 (range: 3–4.25) whereas group Low (L, n=14) had a significantly lower BCS (median: 2.5, range: 2–3.75, p=0.01). Both groups were kept in pasture until the 7th month of gestation when they were housed indoors and fed forage and concentrate (barley). Food intake was not different between groups. Mares were weighed every 2 weeks and their BCS was monitored monthly. Placentas and foals were weighed and measured at birth. Foals were measured and their fasting glucose assessed regularly until 12 months of age. A frequently sampled intravenous glucose tolerance test (FSIGT) was performed at 3 days and 4 months of age. Results were analyzed using a Mann-Whitney test.

Results: H mares maintained a significantly higher BCS (median ≥3.75) than L mares from AI until foaling (median at foaling: 3.75, p<0.0001). L mares reached a peak BCS of 3.75 at the 7th and 8th month and thereafter lost BCS until foaling (median BCS at foaling: 2.75). Mares' body weight was not different between groups at any time. Gestation length did not differ between groups. H placentas tended to be 15% lighter with a 10% reduced surface compared to L placentas (p=0.071). Foals' weight and measurements at birth were not different but the placental efficiency (foal/placental weight) tended to be 12% higher in H mares (p=0.078). There was no difference in foals' growth until 12 months. H foals' fasting glucose tended to be higher at 3 days (p=0.063) but there was no difference in the glucose response to the FSIGT. Plasma insulin concentrations are pending.

Conclusion: H mares tended to have a lighter placenta and with a reduced surface area that was more efficient than L mares. Their foals tended to have greater fasting plasma glucose than L foals at 3 days. The fact that the BCS of H and L mares throughout gestation matched their BCS at AI highlight the importance of periconceptional BCS. This study follows a previous one showing that feeding mares in the 2nd part of gestation with two different energy sources does not affect feto-placental biometry and foal development until the age of 6 months (Peugnet et al 2015). Nevertheless, periconceptional BCS appears to induce placental adaptations that are currently being characterized.

Reference: Peugnet et al. (2015) Plos One 10, e0122596.

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