

Preliminary results on glycaemic response after oral glucose tolerance test (OGTT) in sows derived from assisted reproductive technologies

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In human, murine and rabbit species, individuals derived from embryos produced in vitro (IVP) may present, among others, disorders in glucose metabolism (Chen et al. 2014, Diabetes 63:3189-3,98; García-Domínguez et al. 2020, Animals 10:1043-1059). In pigs, available information is very scarce and we have reported in 45-days-old piglets differences in the glycaemic response after an oral glucose tolerance test (OGTT) between IVP-produced animals and those conceived in vivo by artificial insemination (AI) (Paris-Oller et al. 2022, JDOHaD 13:593-605). However, it is unknown if these differences are corrected or maintained during adult life. The objective of the present study was to evaluate the glucose tolerance in the same colony of pigs during their adult life by means of an oral glucose tolerance test (OGTT). The animals were obtained from a previous study (Paris-Oller et al. 2021, J Anim Sci Biotech 12:32-44) that were born after artificial insemination (AI group) and surgical transfer of in vitro-produced embryos (IVP group). All animals were kept under same housing and feeding conditions since birth. The OGTT was performed in AI (n=8) and IVP (n=10) sows with 3.5-3.6 years age, and weighing from 227 to 249 kg. For the OGTT, animals were previously fasting for 24h and 2h without drinking water. Sows ingested 1.75 g/kg body weight of glucose solution (100% glucose carbs, Myprotein) and blood samples were collected via auricular vein before OGTT (t=0) and over 240 minutes (15, 30, 45, 60, 90, 120, 150, 180, 210 and 240 min) following glucose administration. Blood glucose concentration was immediately measured by a glucometer (Aposan) using test strips, and blood serum was obtained and freeze (-80°C) until determination of insulin (immunoturbidimetric method) and glucagon (10-1281-01 Mercodia, Uppsala, Sweden). Data were analysed using an ANOVA test with nested design (animal within reproductive treatment group) and reproductive treatment (AI, ET) and time of sampling and interaction treatment and time as the main factors. Data are expressed as mean $\pm$ SEM. Values of $p < 0.05$ were considered significant. Glycaemia was influenced by time of sampling ($p = 0.019$) and was higher in AI-derived animals than in IVP group (66.95 ± 1.29 vs. 60.57 ± 1.31 g/dL, $p < 0.001$), while the interaction group and time was not significant ($p = 0.401$). On the other hand, the insulin concentration was only influenced by the origin of the animals, with higher values in IVP than AI animals (58.66 ± 4.88 vs. 75.79 ± 4.27 μ UI/ml, $p = 0.013$). As for the glucagon concentration, it was similar for all the times of sampling and between groups (AI: 2.84 ± 0.39 vs. IVP: 2.75 ± 0.24 pmol/L, $p = 0.664$). These observations suggest that, up to some extent, the differences in the response to OGTT in IVP-produced pigs are maintained during their adult life. Moreover, IVP sows challenged with an OGTT show changes in the insulin response. Increasing the number of animals, and determination of complementary biochemical parameters are needed for a better interpretation of the results.

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