Lengthening of the remating interval improves body condition and reproduction efficiency of lactating rabbit does

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ABSTRACT

The requirements of intensively reared rabbit does are very high because of the overlapping of lactation and pregnancy. In this situation, it is important to adopt the most appropriate reproductive system to improve the energy balance of the lactating does and to maximise their productive potential. Previous studies demonstrated that an increase of dietary energy content is often not sufficient to cancel the energy deficit and avoid intense body mobilisation. A negative energy balance is detrimental for the reproductive process and the length of the reproductive life is shorter in intensively than in extensively reared does. Therefore, it seems interesting to study strategies which can reduce the energy mobilisation in lactating females and improve their reproductive performance. This research evaluated body condition, as assessed by some blood metabolites profiles, and pregnancy rate of 120 multiparous hybrid rabbit does submitted to different reproduction rhythms: AI at 11 (I11=60) or 25 (I25=60) d after kindling and weaning at 35 d. Blood samplings (=360) were repeated at 12, 26 and 36 d *pp* in all the rabbits. Glucose was analysed by the glucose oxidase method (Sigma), non-esterified fatty acids (NEFA) using a two-reaction enzymatic-based colorimetric assay (Wako) and plasma urea nitrogen (PUN) by a colorimetric assay (Sigma). Reproduction efficiency was evaluated by abdominal palpation 15 d after AI to determine the pregnancy rate (PR) (pregnant does x 100/IA). All data were analyzed by GLM SAS-procedure. The trial was repeated for two consecutive reproduction cycles with identical experimental design; however, no significant differences were found between cycles. Throughout the experiment mean concentrations of glucose, the body's major energy source, and PUN were both lower in I11 compared to I25 (87.6 vs. 115.7 mg/dl; 11.2 vs. 15.8 mg/dl; $P<0.05$). In contrast, NEFA mean level resulted higher in I11 rather than in I25 (*0.313 vs.* 0.279 mmol/L*;* $P<0.05$). Moreover, NEFA values were consistent with a steadier mobilisation of adipose depots during lactation in I25 than in I11 (0.247-0.288-0.301 *vs*. 0.283-0.338-0.318 mmol/L; $P<0.05$). NEFA are released by the action of hormone sensitive lipase on triglycerides stores in adipose tissue and high NEFA concentrations are indicative of negative energy balance. Hence, low circulating NEFA may reflect direction of fat metabolism towards reduced lipolysis due to increased plasma insulin concentrations. The observation that PUN was constantly lower in I11 throughout the trial, suggests that an alteration of protein metabolism occurred during lactation. As a matter of fact, in energy deficient rabbits protein-sparing adaptation comes into play to limit turn-over and degradation of protein, whereas during compensatory higher energy intake, increased protein synthesis is associated with decreased nitrogen excretion and lower plasma urea. PR was higher in I25 does compared to I11 (82.4 *vs.* 71.3%; $P<0.05$). PR increased when does were mated later after kindling, suggesting the progressive recovery of reproductive ability during lactation. The present results demonstrate that limiting the nutritional solicitation of females by shortening the length of superposition between lactation and pregnancy, could permit to reduce body stores mobilisation, improving in the meantime body condition and reproduction efficiency.