Effect of energy supplementation between birth and 3 weeks on growth rate in puppies

Boutigny.L[a], Grellet.A[b], Feugier.A[a], Mariani.C[a], Mila.H[b], Chastant-Maillard.S[b]
[a] Royal Canin S.A.S, 650 Avenue de la Petite Camargue, Aimargues, France.
[b] Neocare IHAP, Université de Toulouse, INRA, ENVT, Toulouse, France.
laure.boutigny@royalcanin.com; a.grellet@envt.fr

Introduction. Neonatal mortality affects 15 to 25% of newborn puppies[1]. Birth weight, Apgar score, rectal temperature, glycaemia, and growth rate (GR) between 0-2 days of age are validated monitoring tools to identify puppies at risk of death[1]. During first weeks of age, puppies depend entirely on colostrum and milk intake. However spontaneous suckling could be insufficient in weak puppies. The aim of the study was to evaluate the impact of an energetic supplementation during the neonatal period on the puppies' growth taking into account their status at birth.

Animals, material and methods. The experiment was carried out within 2 multiracial breeding kennels on 94 puppies born from 16 bitches of 9 different breeds. At birth, puppies were identified and their breed and litter size were recorded. Depending on their expected adult body weight, puppies were classified into 2 sizes: small (≤25kg), and large breed dogs (>25kg). All puppies were allowed to freely suckle their mother during the whole study period. Within each litter, puppies were allocated into 2 groups (supplemented or control) depending on their birth weight. The supplemented group (n=47) received the milk replacer PUPPY PRO TECH, Royal Canin®, energetic value from fat=59%, proteins=23% and carbohydrates=19%; whereas control group (n=47) received no supplementation. Milk replacer was proposed twice a day from birth to 3 weeks of age and administrated via a feeding bottle (weighed before and after each administration to evaluate the quantity of milk ingested). At birth, an adapted Apgar[2] score (without heart rate), weight, glycaemia, suckling reflex, and rectal temperature were evaluated. At 2, 21 and 49 days of age, puppies were weighed. Linear mixed models, with litter variable nested within breeding kennel as a random term, were used to examine factors associated with GR between 0-2, 2-21 and 21-49 days of age. Data were expressed as Least Square Means (LSM) ± SE.

Results. At birth, there was no significant difference between the supplemented and control groups in weight (p=0.628), glycaemia (p=0.793), Apgar score (p=0.428) and temperature (p=0.767). The LSM of spontaneous milk replacer consumption from birth to 21 days of life was 5.3±1.3ml/100gBW/day. GR0-2 was significantly influenced by supplementation (p=0.002), litter size (p=0.034), temperature (p=0.003), and Apgar score (p=0.027) with an interaction between birth weight and supplementation (p=0.034). GR0-2 was significantly higher on supplemented vs control low birth weight puppies (weight below the median value; 13.9±2.5% vs 7.5±1.9%, p=0.006), with no significant effect of supplementation on normal birth weight puppies (p=0.936). GR2-21 was significantly influenced by supplementation (p=0.001), litter size (p=0.003), breed size (p=0.025) with an interaction between breed size and supplementation (p=0.035). GR2-21 was significantly higher in supplemented vs control large breed puppies (271±14% vs 237±15%, p=0.001), with no significant effect of supplementation in small breed puppies (p=0.854). GR21-49 was influenced by supplementation with a higher GR in control vs supplemented puppies (174±8% vs 155±7%, p=0.048). Puppy body weight at 49 days was significantly influenced by breed size (p<0.001) and birth weight (p=0.012) but not by supplementation (p=0.075).

Conclusion. This study highlighted that growth rate during the neonatal period is altered in large litters. An energetic supplementation can optimize growth rate of low birth weight and large breed puppies until 21 days of age without impacting their weight at weaning. It thus suggests that for these two categories of puppies, the quantity of milk ingested is insufficient, probably due to lack of vitality for low birth weight puppies and due to insufficient milk production in large breed puppies.

Reference. [1] Mila H. Chastant-Maillard S. EVSSAR Congress. Wroclaw, Poland, 2014. p 127-130. [2] Veronesi et al.Theriogenology, 2009;72(3):401-7.

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