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## MONITORING OF NEWBORN DOGS - WHO IS AT RISK OF DEATH?

### Introduction

As in other animals, also in dogs the neonatal period, defined as the first three weeks of life, is essential for the survival of puppies. During this period, puppies not only ingest exclusively milk, are poikilothermic (immature thermoregulation system), but also are born hypogammaglobulinemic (almost null passive immunity level) and finally are unable to defecate or urinate without a stimulation by the mother. Therefore, it is not surprising that 75% of the total mortality before weaning occurs during the neonatal period. Despite the high rate of neonatal mortality in breeding kennels, no monitoring system exist during the first days after birth. Our studies permitted to determine some parameters identifying puppies at a higher risk of neonatal mortality when evaluated quickly after birth, and thus providing them with adequate aid.

### Birth weight

Low birth weight (defined as 25% of the lowest weight values registered within a breed size) was determined as a factor of risk for puppies' survival during the first two days after birth <sup>(1)</sup>. Indeed, low-birth-weight puppies are especially vulnerable to hypothermia and hypoglycemia. Moreover, they have low energetic reserves at birth (low fat tissue and glycogen level) and higher than in normal-birth-weight puppies body surface / body mass ratio, putting them at higher energetic demands. Our studies demonstrate that almost 80% of puppies dying during the first two days after birth are low-birth-weight puppies. This at-risk group, should be weighed twice per day and their body temperature and blood glucose should be monitored (see below).

### Body temperature

As previously mentioned, puppies cannot maintain stable body temperature during the first week of life. In case of low ambient temperature or insufficient milk intake (or rather low energy intake) puppies are at higher risk of hypothermia, defined as rectal temperature below 35°C <sup>(2)</sup>. In consequence, no suckling reflex, decreased peristalsis or septicemia may appear leading to death. To avoid hypothermia newborn dogs should

be warmed up as soon as possible after birth, and thereafter an optimal temperature should be provided and be maintained in the whelping box (28-30°C during the first, 26-28°C during the second and 24-26°C during the third week of life). In weak puppies or puppies with low-birth-weight, body temperature should be monitored systematically (i.e. twice per day).

### Blood glucose

Due to low level of body fat tissue as well as limited liver and muscle glycogen reserves, first colostrum ingestion should appear in puppies before the first 12 hours. Blood glucose evaluation 24h after birth witnesses such a colostrum intake, with glucose level at 90 mg/dl as a threshold value. Indeed, the risk of neonatal mortality in puppies with glucose concentration at 24h below 90 mg/dl was 4 times higher than in puppies with glucose above this threshold <sup>(2)</sup>. Glucose evaluation is an easy method of monitoring of newborn dogs and could be used routinely in breeding kennels. Especially at-risk puppies should be scanned, such as weak puppies or low-birth-weight puppies.

### Growth rate

The energy provided via food intake is spend on body temperature and blood glucose maintenance, on locomotion, on food intake and digestion, and only at the last place on growth. Therefore, the growth rate is a reliable tool to evaluate the energy intake. Normally developing newborn dogs gain from 20g/day in small until 40g/day in large breeds. In case of no weight gain or weight loss, a clinical examination should be performed to exclude gross pathologies of the newborn (cleft palate, eye ball abscess, omphalitis or respiratory tract disease, etc.), but also of the dam (mastitis, metritis, etc.) If no obvious pathology was detected, insufficient energy intake is most probably the cause of the retarded growth.

### Passive immune transfer

Except energy, colostrum and milk provide puppy with other components, crucial for correct development and survival, such as micro and macronutrients, hormones, growth factors and passive immunity. Indeed, authors demonstrated that puppies with low immunoglobulin G (IgG  $\leq$  230 mg/dl) level at two days of life (considered as a

marker of the passive immune transfer from mothers' colostrum to the newborn) have 4 times higher risk of death during the neonatal period than puppies with the adequate passive immune transfer (IgG >230 mg/dl) <sup>(3)</sup>. As evaluation of IgG concentration is limited in veterinary practice, authors established another parameter reflecting the passive immune level acquired by the newborn. Indeed, growth rate between birth and two days of life expressed in % of birth weight was strongly correlated with IgG blood concentration at Day 2. In this study, all puppies which lost weight presented IgG concentration below 230 mg/dl, whereas it was the case only in 1% of puppies which gained weight. Therefore, routine weighing seems to be an easy diagnostic tool to identify puppies at a higher risk of morbidity.

Breeders, but also veterinarians should be encouraged to perform the proposed monitoring system in order to provide at-risk puppies adequate aid and thus to control the neonatal mortality in breeding kennels. If retarded growth or blood glucose <90mg/dl were detected at Day 2, puppies should be fed a milk replacer (2-4ml/100g body weight). If low body temperature was detected (<35°) newborns should be slowly warmed up prior to nursing. And if hypoglycemia was detected (defined as blood glucose below 50 mg/dl), before feeding crystalloids could be provided via a feeding tube.

### References

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