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Pregnancy and lactation nutrition in bitches and queens

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ABSTRACT: This article will cover the basic nutritional requirements to support a bitch and queen throughout pregnancy and lactation. The main issues for the Registered Veterinary Nurse (RVN) regarding nutrition is some clients' lack of understanding of a balanced diet and how an unbalanced diet can affect the development of the foetuses and increase risks to the dam. The RVN is an essential contributor to the education of owners and breeders on the best nutrition for their pets.

KEYWORDS: pregnancy; lactation; gestation; nutrition

Introduction

Pregnancy can be a very exciting time for owners, breeders and the veterinary team. Nutrition plays a huge part in the health, growth and production of both dam and babies and a good nutritional programme can boost conception rate and produce larger and healthier litters. Good nutritional state can maximise the growth rate of newly born puppies and kittens and also ensures a healthy immune system (Jones, 2012a). Ideally, good feeding and management of reproducing animals begins during growth and development of the dam and sire and continues throughout mating, gestation, and lactation.

Many owners will look to either the breeder or veterinary professionals for advice. Some experienced breeders can hold very strong opinions on nutritional programmes for their breeding animals and puppies/kittens, meaning many new owners may be coming to the veterinary surgery confused and/or hold the breeder's opinion in high regard.

Before breeding

The animals should be in good health before breeding is considered. A body condition score (BCS) should be carried out before mating (see Figure 1). Any animal in a poor nutritional state before breeding will usually struggle with the pregnancy, either producing weak litters or putting the dam in danger. This also applies to overweight animals, as it has been proven to put extra stress on the dam during pregnancy and lead to inadequate milk

production (Jones, 2012a). Lack of proper nutrition in the dam can result in decreased birth weight and increased neonatal mortality. Equally, an overweight condition in the dam can lead to the development of very large foetuses and dystocia.

Before breeding the dam should be on a high quality, highly digestible food at least two weeks prior to breeding; this gives the dam a chance to adapt to the food and prevents the potential stomach upsets often caused by a sudden change in diet. If the diet is well balanced there is no need to add supplements (Adams et al., 2018 .a.)

The bitch

The gestation period of a bitch is on average 63 days, this is split into 21 day trimesters. At each trimester different nutritional requirements are needed. Within the first five weeks, little changes are needed to the diet as generally less than 30% of the foetal growth happens in the first five weeks of pregnancy. Although growing, there is only a slight increase in the dam's weight at this point, and therefore only a small increase in nutritional intake is required. After the fifth week, the foetus will rapidly start to increase in size, and will continue this rapid growth for the remaining weeks (Case et al., 2011a).

More than 75% of the foetus's weight will be gained within the 40–55 days of pregnancy (Case et al., 2011a). Here it is especially important to keep up with the bitch's nutritional and energy needs. Energy intake needs to be increased by 25% – 50% of her

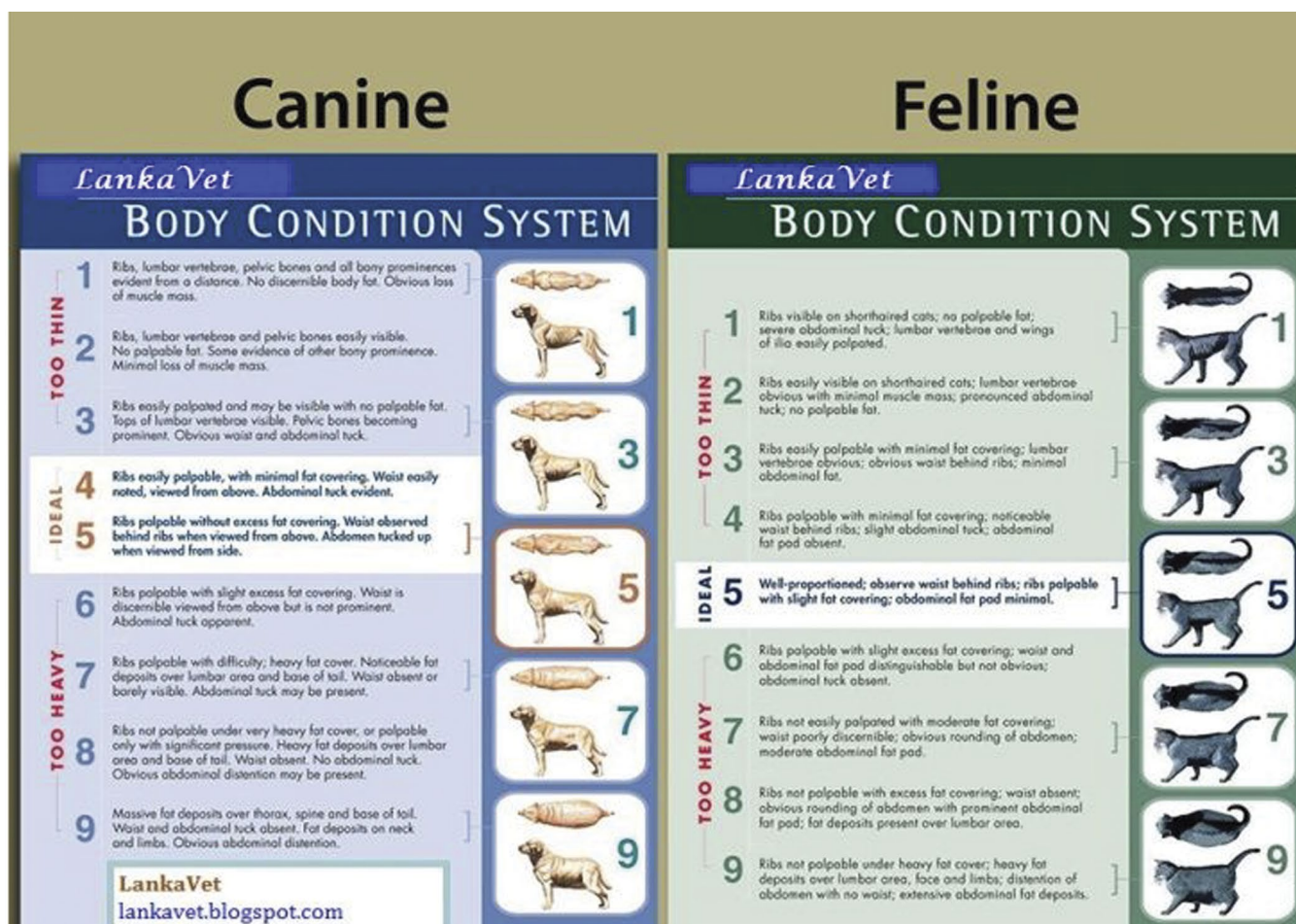


Figure 1. Body Condition Score (Welikala, 2013).

Nutrient	Recommended Level	
	First 2 trimesters	Final Trimester
Energy (kcal/g)	3.5-4.5	4-5
Protein (%)	22-32	25-35
Fat (%)	10-25	>18
Carbohydrate (%)	>23	>23
Phosphorus (%)	0.6-1.3	0.7-1.3
Calcium (%)	0.75-1.5	1-1.7

Figure 2. Target nutritional profile for pregnancy and lactation (Jones, 2012c).

normal maintenance requirement depending on her proposed litter size (Case et al., 2011b). This should continue until whelping. Over all, the bitch will gain approximately 15–25% of her bodyweight between mating and whelping (Jones, 2012a). The bitch may find it hard to eat the calories required due to the increased pressures in the abdomen; several small meals daily will help her in the last three weeks of gestation. It is vitally important now that the dam is able to maintain the weight, if the dam becomes underweight in the middle of pregnancy, it hard to maintain a good BCS due to the high demands of lactation.

Feeding a good, high animal-based protein diet that contains around 20–25% crude protein (Jones, 2012b) will help supply sufficient energy for the bitch and also the developmental tissues of the puppies (see Figure 2). Insufficiencies in protein will lead to a decreased birth weight and a decreased chance of the puppies' survival (Jones, 2012b). Carbohydrates are needed in the diet too. The foetuses will obtain more than 50% of their energy from the glucose broken down in carbohydrate metabolism. Therefore, a bitch's diet should contain at least 23% carbohydrate (Gajanayake et al., 2018b). At day 35 of the pregnancy, the

requirements for calcium and phosphorus increases dramatically due to the rapid growth of the puppies' skeletal system. The diet should contain 0.75%–1.5% of calcium on a dry matter basis, increasing up to 1–1.7% in the final trimester. If the balance of the Calcium:Phosphorus (Ca:P) ratio is inadequate and excess amounts are given this could lead to skeletal disease (Gajanayake et al., 2018a).

After whelping, the bitch should maintain 5–10% above her pre-breeding body weight (Jones, 2012a). Most bitches will start to eat around 24 hours after whelping.

It is important that the dam maintains this weight to keep up with the lactation and the puppies' demands.

Queen

The gestation period for a cat is similar to a dog. The average is 63 days (nine weeks) but a range between 58–70 days is commonly used (Lawler & Stables, 2012). There are noticeable changes very early on in the cats' figure and weight. They start to gradually gain weight at around the second week of gestation. Unlike dogs, cats only lose 40% of the weight they have gained through pregnancy immediately following parturition. The remaining 60% of the queen's weight gain is body fat and is gradually lost during lactation. Therefore, the queen is better prepared for the excessive demands of lactation (Case et al., 2011c).

The queen should be fed on a high quality food designed for pregnant animals and growth. Again, a good, animal-based protein at 32% is required for healthy foetal development. This will also provide the essential amino acid Taurine. An inadequate intake of Taurine can lead to blindness and cardiovascular issues (Merrill, 2009). Plant based protein does not contain the Taurine amino acid, therefore cats are obligate carnivores. Lack of fats (energy) in the diet can determine the litter size. The energy density of the food should be relatively high; at around 20% fat.

There should be an adequate amount of Essential Fatty Acids (EFA) such as omega 3 and 6 which are also required for organ, digestive tract and joint development. Deficiencies in these can also cause skin and eye issues in kittens. Omega 3, also known as Docosahexaenoic Acid, is crucial in brain and retinal development. A deficiency in this can be very serious for the animal's neurological and visual functions (Case et al., 2011d).

The amount of food that the queen receives should be gradually increased beginning the second week of gestation and continuing until kitting. At the end of gestation, the queen should be receiving approximately 25% to 50% more food than her normal maintenance needs. However, excessive weight gain needs to be monitored. She needs to be around 12–38% above the pre-pregnancy weight (Case et al., 2011e).

Lactation

The nutritional requirements during lactation will depend on the amount of milk the



Figure 3. Nursing puppies. Photo permission from Lucy Woonsnam English Bull Terrier Breeder (Gajanayake et al., 2018c).

Pregnancy – First two-thirds	1.8 x RER	
Pregnancy – Final third	3.0 x RER	
Lactation	(1.9 x RER) + 25% per puppy	Depends on lactation period and number of puppies

Figure 4. Resting energy requirement (RER) table.

dam has to produce for the litter size. Lactation requires a lot of calories from the dam. 78% of the milk is water, so keeping the dam's hydration status high is important. The bitch in particular can consume up to five-six litres a day to keep up with the milk production requirements from the litter. Water needs to be readily available all the time (Gajanayake et al., 2018b).

Calorie intake can increase up to 1.5–2 times more than the maintenance requirements depending on litter size in the first week, this increases to two times in the second week and 2.5–3 times in the third/fourth week of lactation. This is due to the puppies/kittens growth rates increasing and the dam's need to keep up with the demand. Around the fourth week they will start to decrease their milk intake and start to move on to semi-solid foods. As this occurs, the dam's daily food intake should be slowly reduced. By the time that the puppies and kittens are of weaning age (seven to eight weeks), the dam's food consumption should be less than 50% above her normal maintenance needs (Case et al., 2011f).

There are many quality, highly digestible pet foods on the market that can provide a sufficient nutritional density. Following the guidelines from a reputable company on feeding, quantities should be sufficient.

If the dam was of a good BCS to start with and has been fed a good quality food

through gestation, lactational requirements should be fine for her (Figure 3).

Eclampsia

Eclampsia (hypocalcaemia, low calcium) disorder can be life-threatening if not detected and treated promptly. Calcium is the most common essential nutrient that is supplemented during pregnancy, especially in dogs as a high volume of calcium is lost by the bitch via her milk during lactation. Eclampsia most commonly occurs at parturition or two to three weeks later. The bitch will show signs of ataxia and have convulsive seizures (Case et al., 2011g). Although calcium needs are high during both gestation and lactation, the bitch and queen can normally acquire the correct amount of calcium needed if a quality, balanced diet is provided. A larger litter will require more milk, thus more calcium, therefore this needs to be taken into account when calculating the dams Resting Energy Requirement (see Figure 4).

Conclusion

Nutrition can be a complicated subject with advice easily obtained via the internet, breeders and the veterinary profession; it can become confusing and overwhelming for owners. Nutritional advice is being updated all the time as new information emerges. Generally there is little knowledge

and understanding by owners of the risks of an 'unbalanced diet' for an animal if their nutritional requirements are not met. These are all heightened when then animal becomes pregnant. With correct planning and management of a nutritional balanced diet, and help and reassurance from the veterinary profession, the best nutritional advice is available to breeders and new owners at this exciting time.

Disclosure statement

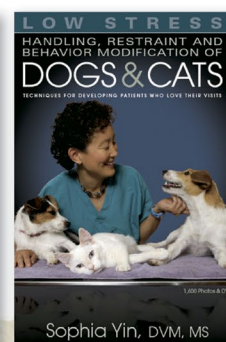
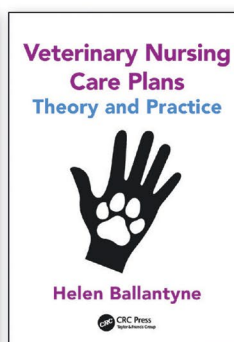
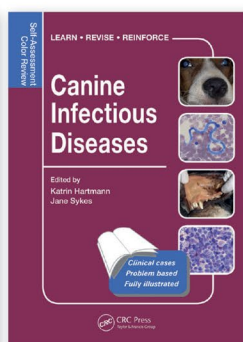
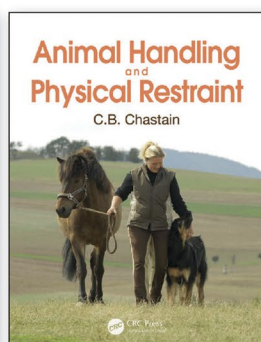
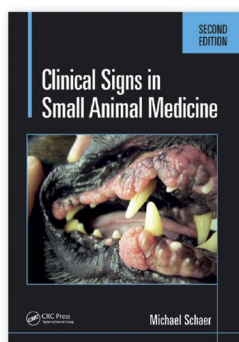
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