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### Factors determining whether it is safe to breed

#### Bitches:

Bitches should be completely developed in skeletal and internal organ development. Once a bitch becomes pregnant, she will devote and divert all necessary calories and energy to fetal growth and later lactation. If she is not fully developed at the time she becomes pregnant, this growth will cease at the point where fetal demands exceed personal demands and will not begin anew when lactation ceases. These bitches therefore may not achieve their maximal potential development. This may result in dystocia due to fetal-pelvic disparity, in particular during pregnancies 2 through 4+, because as the uterus is stretched with each pregnancy, fetal size may increase in a subsequent pregnancy, but pelvic size will not, resulting in fetal-pelvic disparity.

In small and toy breeds, full skeletal development may be complete by 6-8 months of age, but internal organ development and pelvic development is not complete until 16-18 months of age. In large and giant breeds, full skeletal development may not be complete until 14-16 months of age, while internal organ development and pelvic development is not complete until 20-24 months of age.

Domestic dogs tend to reach puberty earlier than wild dogs because food is supplied to them year-round and so they attain 60-70% of their adult weight earlier than do their wild counterparts. In most domestic animals, it is believed that the first pubertal heat will occur around the time that the animal achieves 60-70% of its mature weight. This means that most bitches will have their first heat cycle between 6 and 14 months of age, depending on breed, however, their development is not complete at this stage, so it is not recommended that they are bred on their first heat, unless it is delayed until they are fully mature (typically due to some other stressor preventing cyclicity earlier, such as heavy performance training).

Other concerns about breeding younger bitches would include inadequate mammary development and decreased fat stores to be utilized during lactation for energy reserves. This is particularly true in the toy breeds where hypoglycemia and hypocalcemia are more common. The age at which appropriate health testing can be performed will vary with breed.

Bitches should be healthy and in good body condition prior to breeding. Any health concerns should be discussed with your veterinarian prior to breeding and any and all medications or dietary supplements given during pregnancy or lactation should be evaluated for safety to the embryo, fetus or neonate. Bitches in heavy body condition may not ovulate as many eggs, may not lactate as well and may develop problems with respiratory distress in late pregnancy due to

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increased compression of the lungs by the diaphragm due to increasing uterine size compressing it. Brachycephalic bitches should be bred with caution in the warm summer months as they may be more predisposed to overheating as the chest cavity is compressed in later pregnancy by the enlarging uterus within the abdomen.

At the opposite end of the age spectrum, it should be remembered that pregnancy is an extremely taxing physiologic process, and there are some considerations to be evaluated in terms of whether a bitch is too old to breed. The uterus and kidneys share the same blood supply, so when a bitch becomes pregnant, some blood flow is diverted away from the kidneys to supply the ever-enlarging pregnant uterus. Any early onset kidney disease, may be exacerbated by pregnancy. Older bitches are also more predisposed to pregnancy related diseases such as gestational diabetes and pregnancy toxemia, and so body condition prior to breeding should be carefully assessed. Bitches that are too heavy or too thin should not be bred as their risks for these energy-related disorders will be much higher. Physical issues such as arthritis or other orthopedic injuries should also be considered as they are difficult to treat during pregnancy and may result in the bitch being painful for a prolonged period of time.

Recommended bloodwork in older bitches includes a complete blood count, complete serum chemistry panel, screening thyroid hormones (total T4 +/- free T4 and thyroid stimulating hormone or TSH), urinalysis (paying particular attention to urine specific gravity, USG, and protein content), and a urine protein:creatinine ratio (or urine microalbuminuria). The age for this testing is generally recommended is 7-8 years for toy, small or medium breeds; 6-7 years for large breeds; and 5 years for giant breeds.

Stud dogs:

Males should not be bred before they attain puberty and are at least 1 year of age in order for them to attain full physical stature and to be mentally capable of understanding their status in the kennel once breeding begins. Breeding males tend to be more aggressive and promoting aggressive behavior in a young, developing dog may result in behavior issues later in life (inter-dog aggression in particular). Sexual maturity and thus fertility will not peak until 3-5 years of age in most males, but sperm production begins once puberty is attained. A complete semen evaluation should be performed on the young stud dog to ensure that he is producing adequate numbers of motile, morphologically normal sperm prior to use.

Older males should be assessed for physical ability to breed. Individuals with cardiac disease, orthopedic disease, or other debilitating illnesses may not have the stamina for natural breeding. In some cases of advanced respiratory or cardiac disease, even manual collection may be too strenuous for these dogs.