

7. SUMMARY

The investigation of the **PRE- AND PERINATAL DEVELOPMENT OF THE CANINE CLAW** presented in this study was based on 19 canine specimens ranging from a crown rump length (CRL) of 44 mm to 220 mm, and on four neonate puppies aged up to one week. For comparison of the developing claw structures with those of the mature claw, four claws of adult dogs were included into the scope of the study. Besides macro- and mesoscopic examination, routine light microscopical staining and histochemical techniques as well as scanning electron microscopy were employed for characterisation of the claw specimens.

Taking the development of subcutaneous and dermal angioarchitecture as well as the formation of segment-specific modifications of the papillary body and the respective epidermal structures into account, the developmental processes involved in the formation of the canine claw were subdivided into three different stages. The first two developmental stages take place within the pre- and perinatal period, whereas the third stage describes the adaptive processes of the juvenile and adult claw. The FIRST STAGE comprises fetuses of 44 mm CRL up to a CRL of 80 mm (day 30 to 42 of pregnancy). This stage is characterised by formation of the subcutaneous and the profound dermal vascular plexus, whereas the dermal papillary body appears mostly undifferentiated and thus not yet region-specifically modified. It is of particular interest that the subcutaneous plexus of the presumptive wall and solear segment is covered by ossified tissue layers and thus integrated into the peripheral part of the ungicular process of the distal phalanx. The SECOND STAGE of claw development comprises fetuses of more than 80 mm CRL (day 44 of pregnancy) and, according to the present study, ends one week post natum. Alongside with the definite formation of the subcutaneous and deep dermal vascular plexus, the development of a segment-specific dermal papillary body associated with the formation of respective epidermal modifications dominate this stage of claw development. The THIRD STAGE regards the structural alterations of the juvenile and adult claw after the development of the segment-specific papillary body. It is characterised by function-related adaptive modifications of the subcutaneous, dermal and epidermal layers of the claw.

The results of this study regarding the pre- and perinatal development of the claw allowed a reappraisal of the HOMOLOGY CRITERIA employed for the allocation of the different segments of the canine claw:

1. Development, specificity and differentiation of presumptive subcutaneous and dermal layers, respectively, according to the formation of specific angioarchitectural features (primary homology criterion)
2. Development of the dermal segment-specific papillary body (secondary homology criterion)
3. Development of the segment-specific epidermal modifications under consideration of the respective horn-production rate (tertiary homology criterion)

Thus, the segment-allocation of the canine claw corresponds with the respective segments of the digital end organs in the horse and cattle, i.e., PERIOPLIC, CORONARY, WALL, and BULBAR SEGMENT.

Comparable to the highly derived weight-bearing apparatus in the equine hoof and bovine claw, the canine claw likewise features corresponding - but not as highly specialised - weight-bearing-associated structures. In comparison with the feline claw, it is apparent that both types, i.e., feline and canine, of the carnivore claw, display distinct functional and structural differences. Therefore, the canine and the feline claw have to be considered separately. Whereas the carnivore claw is generally regarded as the primary phylogenetic type of the mammalian digital end organ, the apparent structural differences between feline and canine carnivore claw lead to the assumption that the feline claw is the primary type of carnivore claw, and the canine claw, in turn, represents a more derived type of carnivore claw.

The results of the present study contribute to and expand the basic knowledge on the structure of the canine claw, and should therefore be considered in the future evaluation of physiological and pathologically altered structures of the claws in dogs.