Tutorial Article

Podiatry terminology

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Keywords: horse; hoof; foot; farrier; terminology

Introduction

The importance of podiatry as a part of equine veterinary practice is well recognised. Cooperation and the symbiotic relationship between the veterinary and farrier professions continue to grow and improve. Historically, there has not been a standardisation of podiatry terms that can be used for communication, both verbal and written, between veterinarians, farriers and horse owners. Furthermore, a uniform list of podiatry terms should benefit veterinarians and farriers in their record keeping and help augment their written reports. Authors writing in veterinary and farrier journals should be encouraged to adhere to recognised terms and to qualify their descriptions wherever possible. The authors of this article have attempted to create a glossary of podiatry terms that will form the basis for a common language related to the equine foot. This glossary provides an accurate basis of podiatry terms that, with revisions and additions, will continue to evolve in the future.

Term	Podiatry term category	*Nomina anatomica veterinaria* (NAV)	Definition
Abaxial	Anatomical		Away from the axis of a body part. In podiatry refers to the digit or foot.
Abscess	Pathological process		An accumulation of purulent exudate. In the foot, this usually refers to a localised accumulation of exudate between the germinal and keratinised layers of the epithelium, most commonly subsolar or submural.
Acute laminitis	Disease		1) The initial stages of clinical laminitis. 2) The phase of laminitis beginning with the onset of clinical signs that lasts until either resolution or displacement of the distal phalanx occurs.
Angle of the sole	Anatomical	*Angulus soleae* (*medialis* and *lateralis*)	Palmarmost or plantarmost part of the crura of the sole between the hoof wall at the heel and the bar. Synonym: seat of corn.
Arteriovenous anastomosis	Anatomical		A direct communication between the arterial and venous circulations without an intervening capillary bed.
Axial	Anatomical		Towards the axis of a body part. In podiatry refers to the digit or foot.

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Term	Podiatry term category	NAV	Definition
Balance	Descriptive (clinical)		An anatomical and functional concept that describes the relationship between the hoof capsule, the underlying musculoskeletal system and the ground. Can be considered as a subclassification or a separate definition to conformation. 'In balance' is best described as a harmonious relationship between the hoof capsule and the deep musculoskeletal structures that is most likely to permit lasting soundness.
Bar			1) The inflexion of the hoof wall that lies between the crura of the sole and paracuneal sulcus; 2) Any part of a shoe that extends from one branch towards the other. May be partial or complete.
Basement membrane	Anatomical		A thin membrane underlying a layer of epithelial cells. In the foot it underlies the stratum basale of the epidermis. It conforms to the surface of the dermal papillae and lamellae.
Bilateral	Anatomical		Pertaining to both sides of the body, i.e. left and right limb.
Breakover	Descriptive (clinical)		The phase of the stride between the time the heel lifts off the ground and the time the toe lifts off the ground.
Breakover point (point of breakover)	Descriptive (clinical)		The most dorsal part of the ground surface, either the hoof capsule in the unshod horse or the shoe in the shod horse that is in contact with the ground at the moment the heels begin to rise off the ground.
Broken-back foot-pastern axis	Descriptive (clinical)		The angle that the dorsal hoof wall makes with the ground is lower than the angle the dorsum of the pastern makes with the ground. This angle can be measured using radiographs but it is difficult to measure accurately because it changes with positioning and weightbearing.
Broken-forward foot-pastern axis	Descriptive (clinical)		The angle that the dorsal hoof wall makes with the ground is greater than the angle the dorsum of the pastern makes with the ground. This angle can be measured using radiographs but it is difficult to measure accurately because it changes with positioning and weightbearing.
Bruise	Pathological process		Haemorrhage within tissues usually caused by blunt trauma. In the foot most commonly occurs in the solar dermis and is seen when extravasated blood migrates into the epidermis. May be focal or diffuse.
Buttress	Anatomical		The most palmar/plantar aspect of the hoof wall at the heels. Formed at the point of inflexion of the wall at the heels. Synonym: angle of the wall.
Buttress foot	Descriptive (clinical)		A change in shape of the foot characterised by a prominence at the dorsal coronet caused by an exostosis on the extensor process of the distal phalanx.
Canker	Disease		A chronic, hypertrophic, moist podermatitis that usually affects the frog, bars and adjacent sole. Often accompanied by a foul odour.

Term	Podiatry term category	NAV	Definition
Capsular rotation	Descriptive (clinical)		Describes the divergence of the dorsal hoof wall from the dorsal parietal surface of the distal phalanx independent of the relationship of the distal phalanx with the phalangeal axis. Results from laminitis or white line disease.
Chronic laminitis	Disease		The phase of laminitis that begins with separation of the dermal and epidermal lamellae resulting in mechanical collapse of the foot. Results in displacement of the distal phalanx relative to its normal relationship with the hoof capsule.
Club foot	Descriptive (clinical)		An upright conformation of the foot associated with a flexural deformity of the distal interphalangeal joint. The dorsal hoof wall angle is steep accompanied by a broken-forward foot-pastern axis. The distance between the heels is normal.
Conformation	Descriptive (clinical)		The size and shape of the distal limb determined by the shape and size of the individual structures of the limb and the spatial relationship between them.
Contracted heels	Descriptive (clinical)		Decreased width of the palmar/plantar aspect of the foot so that the heel bulbs and buttresses are closer together than normal. Associated with a decrease in frog width relative to the length. May be associated with elongated or collapsed heels.
Corium	Anatomical		Synonym for dermis.
Corn	Disease		Bruise in the angle of the sole.
Corona	Anatomical	Corona	Band-like proximal portion of the hoof, including epidermis, dermis and subcutaneous tissue deep and distal to the limbus.
Coronal	Anatomical	*Coronalis*	Pertaining to a coronal structure. Specifically, the corona of the foot.
Coronary band	Anatomical	Corona	Synonym for corona.
Coronary groove	Anatomical	*Sulcus coronalis*	A groove in the proximal border of the hoof capsule that contains the germinal layers of the epidermis, the dermis, and subcutaneous tissue of the coronary integument. Synonym: coronary sulcus.
Coronet	Anatomical	*Margo coronalis*	Proximal border of the hoof capsule wall.
Crena	Anatomical	*Crena marginis solearis*	A shallow notch in the dorsal solar margin of the distal phalanx (P3).
Cuneate	Anatomical	Cuneus	Pertaining to the frog.
Dermal lamellae	Anatomical	*Lamellae dermales*	Lamellae formed by the parietal dermis, which interdigitate with the epidermal lamellae.
Dermis	Anatomical	Dermis	Layer of integument between the subcutaneous tissue and the epidermis. Composed of connective tissue, vessels and nerves.

Term	Podiatry term category	NAV	Definition
Derotation	Descriptive (clinical)		See realignment of distal phalanx.
Developmental laminitis	Disease		The phase of laminitis between the initiating cause and the development of lameness. Synonym: prodromal laminitis.
Digit	Anatomical		The extremity of the limb distal to the metacarpophalangeal joint.
Digital cushion	Anatomical	*Pulvinus digitalis*	Modified subcutaneous tissue composed of fat, connective, and elastic tissue. The digital cushion is the sum of the cuneate (frog) and toric (bulbar) cushions. Forms the bulbs of the heels. Thought to function by dissipating energy.
Distal displacement of the third phalanx	Pathological process		Even movement of the distal phalanx distally within the hoof capsule in horses with laminitis such that the distal phalanx remains in alignment with the dorsal hoof wall and the phalangeal axis. Often referred to as a 'sinker'. As opposed to rotation of the distal phalanx.
Distal phalanx	Anatomical	*Phalanx distalis*	Most distal bone of the limb. Encased within the hoof capsule. Synonyms: third phalanx, coffin bone, *os ungulare* and P3.
Dorsal	Anatomical		In the limbs this refers to the cranial facing surfaces from the carpus and hock distally. Opposite to ventral, palmar and plantar.
Dropped sole	Pathological process		Collapse of the normal arch or concavity of the sole so that the sole is flat or convex.
Duckett's bridge	Descriptive (farrier)		Refers to a transverse line drawn across the centre of the foot. The bridge lies on an imaginary line drawn vertically through the centre of rotation of the distal interphalangeal joint and corresponds to the widest part of the foot. Provides a good reference point for trimming the foot.
Duckett's dot	Descriptive (farrier)		An external reference point located 10 mm behind the apex of the trimmed frog on the average size foot. Reference point which is used to locate the centre of the distal phalanx.
Dynamic balance	Descriptive (clinical)		The concept of balance applied to feet of an animal in motion. Mediolateral dynamic balance describes the relationship between the medial and lateral side of the foot as it lands. Dorsopalmar dynamic balance describes the relationship between the toe and the heels as the foot lands.
Epidermal lamellae	Anatomical	*Lamellae epidermales*	Lamellae formed by the parietal epidermis.
Epidermis	Anatomical	Epidermis	Most superficial layer of the skin or integument.
False sole	Descriptive (clinical)		A false sole is a layer of cornified epithelium that is detached from an underlying layer of cornified solar epithelium that is attached to germinal epithelium and dermis in the normal fashion. May result from a previous abscess.

Term	Podiatry term category	NAV	Definition
Flare	Descriptive (clinical)		A local or general deviation of the hoof wall away from the central axis of the foot.
Flat footed	Descriptive (clinical)		A hoof capsule that has no concavity to the sole.
Flexural	Descriptive (clinical)		Abnormal flexion of a joint, frequently the distal deformity interphalangeal or metacarpophalangeal joint, caused by relative shortening of the musculotendinous structures on the flexor surface of the limb.
Floating	Descriptive (farrier)		To unload a section of the foot by creating a space between the foot and the shoe.
Foot	Anatomical		The specialised extremity of the digit. The hoof and all structures enclosed within it.
Foot-pastern axis FPA	Descriptive (clinical)		The axis formed by the dorsal surface of the hoof wall and the dorsal surface of the pastern viewed from the lateral aspect.
Founder	Pathological process		A lay term for chronic laminitis: the latter term is preferred.
Frog	Anatomical	*Cuneus ungulae*	The 'digital pad' of the horse which includes the epidermis, dermis and subcutaneous tissue. It lies between medial and lateral bars and crura of the sole.
Gravel	Descriptive (clinical)		A lay term for a variety of abscesses involving the dermal, soft tissue structures of the foot, especially those that drain at the coronary band.
Heel	Anatomical		Palmar portion of the foot that includes the bulbs and the palmarmost aspects of the wall, sole and frog.
Heel bulb	Anatomical	*Torus ungulae*	Integument immediately proximal to the point of inflexion of the wall palmarly/plantarly. The *stratum corneum* forms the bulbs of the hoof capsule and the subcutaneous tissue forms the palmar part of the digital cushion.
Hoof	Anatomical	Ungula	Integument of the foot and includes the epidermis, dermis and subcutaneous tissue (*tela subcutanea*).
Hoof angle	Descriptive (clinical)		The angle the dorsal hoof wall makes with the ground.
Hoof capsule	Anatomical	*Capsula ungulae*	Horny hoof, formed by the cornified or horny epidermis (*stratum corneum*) of the limbus, corona, wall, sole, frog and heel bulbs.
Hoof-pastern axis	Anatomical		Synonym: foot-pastern axis
Hoof rings	Descriptive (clinical)		Rings formed in the hoof wall distal to the coronet that are associated with variations in hoof wall growth.
Hoof wall	Anatomical	*Paries corneus*	Horny wall formed by the *stratum internum*, *stratum medium* and *stratum externum*.

Term	Podiatry term category	NAV	Definition
Hoof wall separation	Descriptive (clinical)		Disruption of the hoof wall's structural integrity. Commonly seen where all or part of the *stratum medium* is separated from the *stratum internum*.
Horn-lamellar distance (HL)	Descriptive (radiographic)		Distance measured between the dorsal parietal surface of the distal phalanx and the outer surface of the hoof wall. Synonym for the thickness of the dorsal parietal hoof (preferred).
Insensitive lamellae	Anatomical		A historic synonym for epidermal lamellae.
Jamming	Descriptive (clinical)		Jargon that describes the proximal displacement of the coronary band due to excessive loading of the wall distal to that area.
Keratoma	Disease		A tumour of the keratin producing cells of the epidermis of the hoof.
Lamella	Anatomical		A thin flat layer. Ridges formed by interdigitation of the parietal dermis (dermal lamellae) and epidermis (epidermal lamellae) that extend in a proximal to distal direction in the wall of the hoof. Synonym: lamina.
Lamellar	Anatomical		Pertaining to the lamella. Synonym: laminar.
Lamina	Anatomical	Lamina	Used interchangeably with lamella, though the latter is preferred.
Laminitic rings	Descriptive (clinical)		Refers to unequal hoof wall growth at the coronet that results in a disparity of growth between the toe and the heels i.e. unequal width of rings, which are further apart at the heels than the toe.
Laminitis	Pathological process		Idiopathic inflammation or ischaemia of the submural structures of the foot. Divided into developmental, acute and chronic.
Lateral cartilage	Anatomical		Synonym: ungual cartilage.
Limbus	Anatomical	Limbus	Modified band of integument between the skin and the hoof that forms the softer horn of the stratum externum. Synonym: periople.
Limbic groove	Anatomical	*Sulcus limbalis*	Narrow groove in the *stratum corneum* of the limbic integument immediately proximal to the coronary groove that contains the germinal layers of the epidermis, the dermis and subcutaneous tissue.
Long toe, low heel	Descriptive (clinical)		Describes a foot that is considered to have excessive toe length relative to the conformation of the heel.
Natural balance	Descriptive		Hoof conformation that is modelled after the foot in its (farrier term) natural state i.e. feral horses.
Onychomycosis	Pathological process		A mycotic disease of the nails in humans. There is no direct proven corollary in horses.

Term	Podiatry term category	NAV	Definition
Palmar	Anatomical		Used to describe the caudal facing aspect of the forelimb from the carpus distally. The opposite of dorsal.
Palmar/plantar angle of distal phalanx	Descriptive (clinical)		Angle between the plane of the solar margin of the distal phalanx and the ground measured from a lateral radiograph. Angle can be positive or negative. In fact the angle is distal rather than palmar/plantar.
Parietal	Anatomical		Pertaining to or forming the paries or wall of a cavity. Refers to the wall of the hoof, e.g. parietal dermis, parietal epidermis, parietal surface of the distal phalanx.
Pedal osteitis	Pathological process		A radiographic diagnosis associated with *osteopenia* of the margin of the distal phalanx. Thought to be caused by inflammation of the sole.
Periople	Anatomical	Limbus	Synonym: limbus
Phalangeal rotation	Descriptive (clinical)		Describes rotation of the dorsal surface of the distal phalanx palmarly/plantarly from its normal orientation and relationship with the middle and proximal phalanges, usually occurring concurrently with capsular rotation.
Plantar	Anatomical		Used to describe the caudal facing aspect of the hindlimb from the tarsus distally. Opposite of dorsal.
Prolapsed sole	Descriptive (clinical)		The sole has developed a convexity distal to the solar margin of the distal phalanx.
Quarters		*Paries pars lateralis/medialis*	Abaxial portions of the wall that border the toe dorsally and the heels palmarly. The boundaries are poorly defined.
Quittor	Disease		Infection and necrosis of the ungual cartilage.
Realignment of distal phalanx	Descriptive (clinical)		A term used to describe realigning the palmar/plantar solar surface of the distal phalanx with the normal weightbearing surface of the hoof.
Rotation of the distal phalanx	Descriptive (clinical)		Rotation of the distal phalanx can refer to either deviation of the dorsal surface of the distal phalanx from the wall (capsular rotation) or from the axis of the phalanges (phalangeal rotation), but if unspecified capsular rotation is usually assumed to be the default meaning.
Seat of corn	Anatomical		Synonym: angle of the sole.
Seedy toe	Descriptive (clinical)		Cavitation in the distal hoof wall, usually dorsally, involving the *stratum internum* and/or *stratum medium*. Commonly seen as widening of the sole wall junction.
Sensitive lamellae	Anatomical		A historic synonym for dermal lamellae.
Sheared heels			Displacement of one heel bulb proximally relative to the adjacent heel bulb. Thought to result from abnormal loading on one side of the foot.

Term	Podiatry term category	NAV	Definition
Sinker	Descriptive (clinical)		See distal displacement of the distal phalanx.
Solar	Anatomical		Pertaining to the sole.
Sole	Anatomical	*Solea*	That part of the hoof bordered by the wall, bars and frog.
Static balance	Descriptive (clinical)		The concept of balance applied to a horse's feet with the animal at rest; applies to the symmetry of the limb from the dorsal viewpoint and the foot-pastern axis from the lateral viewpoint.
Stratum basale		*Stratum basale*	Single layer of cells attached to the basement membrane.
Stratum corneum		*Stratum corneum*	Formed from dead keratinocytes.
Stratum externum	Anatomical	*Stratum externum*	*Stratum corneum* of the limbic (perioplic) epithelium. Synonym: *stratum tectorium*.
Stratum germinativum	Anatomical	*Stratum germinativum*	Collective term for the *stratum basale* and *stratum spinosum*.
Stratum internum	Anatomical	*Stratum internum*	*Stratum corneum* of the *parietal epithelium*.
Stratum lamellateum	Anatomical	*Stratum internum*	Synonym: *stratum internum* (deprecated).
Stratum medium	Anatomical	*Stratum medium*	*Stratum corneum* of the coronary epithelium.
Stratum spinosum			Layer between the *stratum basale* and *stratum corneum* several cells thick in which the prickle cells generate keratin filaments.
Stratum tectorium	Anatomical	*Stratum externum*	Deprecated in favour of synonym: *stratum externum*.
Sulcus	Anatomical	Sulcus	Groove.
Third phalanx	Anatomical		See distal phalanx.
Thrush	Disease		A moist exudative dermatitis that involves the central and lateral sulci of the frog.
Underrun	Descriptive (clinical)		Describes angulation of the hoof wall towards the axis of the limb so that the hoof wall lies inside the expected position of the hoof wall in relation to the distal phalanx.
Underrun heels	Descriptive (clinical)		The angle of the heels is considerably less than the angle of the dorsal hoof wall. The horn tubules are commonly folded under the bulbs of the heels.
Ungual cartilages	Anatomical	*Cartilago ungularae*	The cartilage of the hoof that is attached to the palmar/plantar process of the distal phalanx. There is a medial and lateral ungual cartilage. Synonyms: lateral cartilage, collateral cartilage.

Term	Podiatry term category	NAV	Definition
Unilateral	Anatomical		Pertaining to one side of the body, e.g. left or right limb.
White line disease	Descriptive (clinical)		A keratolytic process involving the deeper nonpigmented zone of the *stratum medium*.
White line	Anatomical	*Zona alba*	The junction between the hoof wall and the sole. Actually this junction is seen as a yellow line on the solar surface of the foot.

The specialised terminology found in equine podiatry should be used to keep records for both veterinarians and farriers. It can be used to verbally communicate on a day-to-day basis, to express ideas informally in personal written communication, and to express ideas formally in the literature. As such, it is obvious that it is most important that the meaning of language used in the practice of podiatry be clear and unambiguous. This language is often based on colloquial jargon. Words often arise to fill a conceptual void, either perceived or real, and the meaning of words may change. However, it is important that language used in the literature is consistent, precise and preferably as closely related as possible to the currently accepted norm.

The terms described in this glossary refer to various areas including the gross anatomic morphology of the foot, the shape or conformation of the foot, the function of the foot, and pathological changes associated with diseases of the foot. This glossary is inevitably incomplete. It is our intention that this should be a dynamic document to which new terms will be added, inaccurate terms clarified and colloquial words and expressions deprecated in favour of more scientifically rigorous terms.