

Equine TOUCH senses

We use our horses' sense of touch every day – without it, working with them would be very difficult. Vet Sophie Wilkinson from Fellowes Farm Equine Clinic tells us more about this incredibly sensitive animal

If you watch your horse in his field in summer, you'll notice him frequently twitching, shaking his head and stamping his feet to rid himself of flies – thanks to his sense of touch, he can feel a fly land on a single hair, anywhere on his body. He can also feel sensations such as pressure, pain, heat and cold, which enable him to regulate his body temperature and keep himself from harm – for example, if he touches something that will cut or burn him, he'll feel pain and his body will automatically back away from the dangerous object.

Touching plays a vital role in communication between horses, particularly between mare and foal, and mutual grooming helps to cement friendships. Touch is also the most direct way we can communicate with our horses, and you use it when you ride – for example, applying your legs in the saddle – and when handling him on the ground – for example, applying pressure on the headcollar to ask him to stand while you open the gate.

Our expert



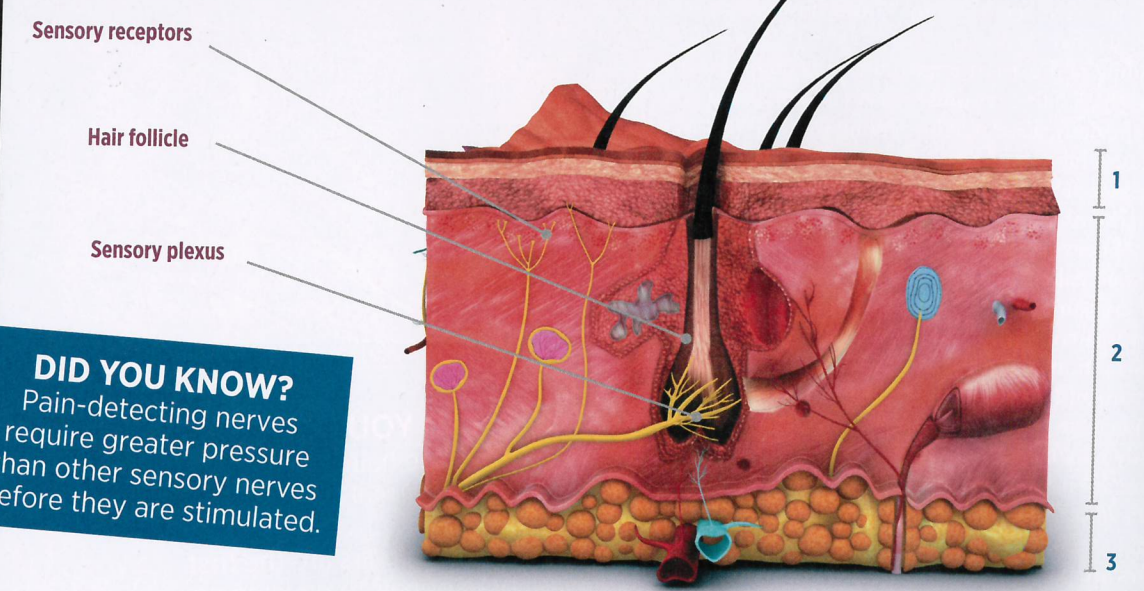
Sophie Wilkinson
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With thanks to XLEquine for their help with this feature. xlequine.co.uk



DID YOU KNOW?
Before performing an intramuscular injection, your vet will often thump the injection site to numb the area.

Your horse's skin
At 12–24% of your horse's bodyweight, his skin is the largest organ in his body and, being rich in nerve endings, it plays a very important role in the sense of touch. It consists of three layers – the epidermis (outermost layer), the dermis (middle layer) and the subcutaneous layer (innermost layer).



DID YOU KNOW?
Pain-detecting nerves require greater pressure than other sensory nerves before they are stimulated.

1. The **epidermis** provides a protective barrier. It contains several types of cell with different functions, including...

- **Keratinocytes** provide a protective layer that keeps in fluids, electrolytes and nutrients, while keeping out harmful agents. A process called keratinisation produces a compact layer of dead keratinocyte cells on the skin surface, which is constantly being renewed.
- **Melanocytes** produce the pigment melanin, which provides protection from the sun. They are located at the base of the epidermis, the outer root sheath of hairs, and the ducts of the sebaceous and sweat glands.
- **Langerhans cells** are part of the immune system, playing an important role in the skin's response to foreign substances, such as the development of a rash when he is exposed to an irritating substance.
- **Merkel cells** are specialised cells that are in contact with nerve fibres and are associated with light touch.

2. The **dermis** nourishes the epidermis, and secretes proteins that give support and elasticity to the skin. The blood vessels that supply the epidermis with nutrients and regulate skin and body temperature are located here. Also present are immune cells that defend against infectious agents that pass through the epidermis, sensory nerves and hair follicles.

3. The **subcutaneous layer** contains fat and muscles, such as the twitch muscle that your horse uses to shake off flies. The subcutaneous fat provides insulation, a reservoir for fluids, electrolytes and energy, and is a shock absorber. Nerves and blood vessels that supply the skin are also found in this layer.



“Touching plays a vital role in communication between horses”



Help from hair

It's not just your horse's skin that's involved in touch, every hair on his body picks up sensations, too. Each hair sits in a follicle in the skin and the base of the follicle is wrapped in a web of nerve endings called the sensory plexus. When the hair is moved, it stimulates these nerve endings and impulses are sent to the brain. This is how your horse knows exactly where a fly is.

Some of the most important hairs on his body are the long, thick hairs around his eyes and on his muzzle that are specially designed for feeling things. We know them as guard hairs and whiskers, but their proper name is vibrissae. The roots of these hairs sit deeper in the skin than the normal hairs on his body, and the follicle has lots of nerve endings and incorporates a special capsule of blood called the blood sinus. The blood sinus amplifies any pressure on the hair, which is then detected by the nerves surrounding the follicle. The nerves send detailed information about the object, including its size, shape, texture and location, to the brain.

Because your horse's eyes are prominent, they can be easily knocked, so the vibrissae around his eyes let him know if his head is close to something before he bashes himself on it. The vibrissae on your horse's muzzle enable him to feel things as we would with our hands. These hairs are particularly important to your horse because he is unable to see directly under his nose, so anything he wants to investigate can be safely examined with his whiskers before he actually makes contact with it.

DID YOU KNOW?
Vibrissae hairs don't moult like normal coat hairs.

Vibrissae hairs are the first type of hair to develop on the horse when it is an embryo.

Super-sensitive skin

Your horse's sense of touch is extremely acute. Some parts of his body are more sensitive than others and this is partly due to differences in thickness of the skin - the thinner the skin, the more sensitive it is. Skin thickness ranges from 1-6mm in horses, whereas ours ranges from 0.5-4mm, although it can vary with age, sex and breed, and from one individual to another - for example, Thoroughbreds tend to have thin, delicate skin, whereas draught horses have thick, coarse skin. The skin is thick over his back and thin under his tummy, and on his lower neck and his face.

In addition, the skin is packed with sensory receptors including...

- **Mechanoreceptors** (such as Merkel cells), which detect touch, vibration and pressure
- **Thermoreceptors**, which detect temperature
- **Nociceptors**, which detect pain

The number of these receptors varies from hundreds to thousands per square inch of skin on different parts of the body - the more sensory receptors there are, the more sensitive the area is. Many of these receptors are simple nerve endings, while some, which look like tiny bulbs or discs, are specifically sensitive to either light or sustained touch.

DID YOU KNOW?
Thin-skinned horses are more sensitive to grooming and girthing.



Using touch to your advantage

The nerves involved with touch tire easily, so if they are overstimulated by constant contact, it can cause a lack of response. This can be helpful if you have a horse who is oversensitive to touch, because repeated contact will eventually desensitise him so he feels more comfortable about being touched. However, it can also work against you - for example, if you nag your horse with your leg while you're riding, he'll become dead to the aid. ■