

The hormonal

Equine reproduction consultant James Crabtree FRCVS explains the physical and behavioural impact of castration to *Catherine Welton*

WHEN we think of horses and hormones, we tend to think of oestrogen and moody mares, and the testosterone-driven posturing of stallions, while geldings are generally viewed as neutral, and immune to those hormonal rollercoasters. The full picture is, however, more complicated.

When colts are gelded, they can no longer produce large quantities of testosterone, making them easier to handle.

"Testosterone is a driver for sexual behaviour and reproduction," explains Dr James Crabtree, junior vice president of the British Equine Veterinary Association and an independent vet consultant in equine reproduction and stud medicine.

"Horses are very big animals; colts that are a bit lairy don't have their minds on the job and can be unpredictable. If you remove that testosterone, you remove that hormonal driving

force behind the unwanted behaviour and the potential barrier to onward training."

HOW FAST DOES IT TAKE EFFECT?

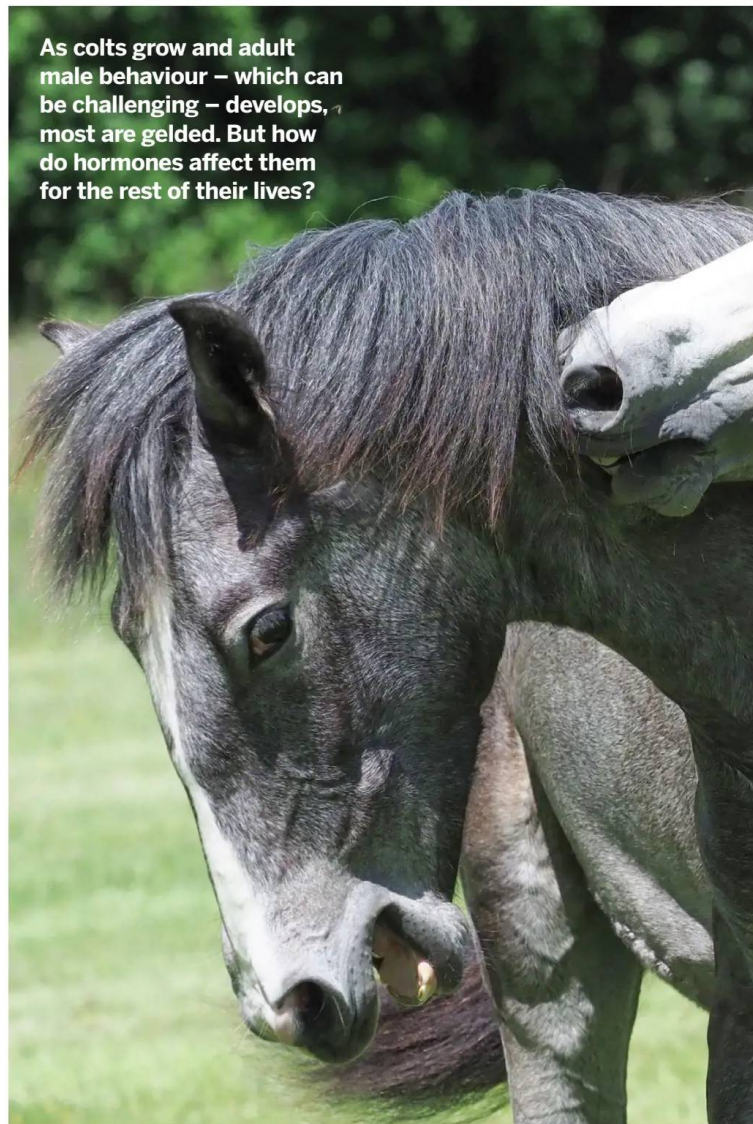
AFTER castration, testosterone levels drop very quickly.

"It can be within a few days," says James. "The reason we talk about not putting a newly castrated colt in with mares isn't because they are still producing sperm, it's because they could still have sperm left in the reproductive tract and the behaviour may not change immediately.

"Behaviour isn't just the hormones; it's also learned. It will vary according to individuals and environment. If the environment is very stimulating, with a lot going on, the horse may take longer to calm down."

A further complication is that testosterone isn't produced only by the testes. Mares also have testosterone, produced by their ovaries and adrenal gland,

As colts grow and adult male behaviour – which can be challenging – develops, most are gelded. But how do hormones affect them for the rest of their lives?



As testosterone is just the last link in a hormonal chain set in motion by longer days in spring, geldings remain affected by seasonal fluctuations in hormone levels even after castration

and a gelding will continue to have very low levels of it.

HOW IS GROWTH AFFECTED?

AS well as being androgenic (responsible for promoting male sexual characteristics), testosterone is also anabolic – that is, responsible for muscle growth. So castration inevitably has a physical impact as well as a behavioural one.

"You can look at lots of different species and see this. For example, bulls are stocky with lots of muscle and bullocks are leaner," says James. "Of course, that doesn't

mean to say that, with training, you can't put the muscle mass on a gelding."

Testosterone also plays a role in bone development as it indirectly helps close the growth plates (the cartilage at the end of the long bone, which fuses upon maturity). If a colt is gelded relatively early, before the plates have closed, the plates can stay open for longer and the gelding may grow taller than if he had been left entire.

These and other factors are taken into account when deciding at what age to geld.

"In racing, some people don't want to geld too early, as

life of geldings



What about social licence?

JAMES points out that we need to consider the gelding procedure from the point of view of public perception, given that it may be regarded as unkind or unnecessary by the general public. But he explains the safety considerations behind it and the social benefit for the horses themselves.

“As vets, we think about surgical procedures on horses a lot, with social licence in mind,” he says. “Primarily it is performed for human and animal safety reasons; however, it is also an intervention to ensure we can keep male horses in mixed sex environments and in sport. Keeping stallions entire is easier with experience and the right environment.”

that testosterone might give the horse a competitive advantage,” explains James. “In contrast, some colts’ testicles aren’t fully descended until they’re three years old, which can present a comfort issue for them in training, and which can be resolved by castrating.”

WHY DO SOME BEHAVIOURS REMAIN?

DESPITE the lack of testosterone, some geldings do continue to demonstrate sexual behaviour long-term after castration and James says the reason behind this isn’t fully understood: “It might

be remembered, as some geldings were stallions for a time, or learnt or genetically programmed.”

In other cases, it may be because the horse has undescended testicles; that is, they are not in the scrotum.

“If a gelding is showing dominant behaviour – often colloquially described as being a bit ‘riggy’ – it can be because there is testicular tissue still there, which you can’t see. In those individuals, we have to do some diagnostics.”

Using a combination of physical examination, ultrasound and hormone tests,

a vet will assess whether any testicular tissue is present. If so, it’s removed surgically.

SEASONAL CHANGES

JUST because a gelding no longer produces testosterone, it doesn’t mean they are immune to the sort of seasonal fluctuations we more usually associate with mares and stallions. This is because testosterone is, in fact, just the last link in a whole hormonal chain that’s influenced by increased daylight in spring.

Horses are “long day breeders”, meaning their young are born in the spring

and summer. As the gestation period is around 340 days, spring is the signal to mate.

“The pineal gland, in mares, stallions and geldings, is responsible for secreting melatonin, which tells them what the season is. Melatonin drops when daylight increases,” explains James. “This sends a message – in the form of the gonadotropin-releasing hormone, GnRH – to the pituitary gland, telling it to release two hormones, luteinising hormone (LH) and follicle-stimulating hormone (FSH).

“These hormones stimulate



Left: some racehorses may be gelded late, to retain the benefits of testosterone.
Below: castration is a common procedure, but not risk-free



the ovaries to produce oestrogen and follicles, and the testes to produce testosterone and sperm cells. The hormonal cascade is happening in the same way in a gelding and it will have the same seasonal changes. It just doesn't lead to testosterone production."

SIDE EFFECTS

TESTOSTERONE is part of a "negative feedback loop". When the testes produce a lot of testosterone, it signals to the brain and pituitary gland to slow down production of the LH and FSH

hormones. Without testes, that feedback loop is interrupted and less inhibited.

Research in dogs reveals some interesting differences between entire males and castrated males.

"There's good evidence that intact males [dogs] have a lower risk of several immune-mediated and autoimmune diseases, making canines one of the veterinary species in which testosterone appears to exert a genuine protective immunological effect, although testosterone also increases the risk of several androgen-dependent conditions, particularly those affecting the prostate and perianal region.

"However, there's currently no evidence to suggest that testosterone has a protective role in the long-term health of male horses."

There's also some evidence with dogs that the drop in testosterone following

castration can cause increased anxiety and fearfulness, but again James says this isn't typically seen in horses.

"Clinically, I don't see a lot of geldings who lack confidence – if anything, you could argue they are not burdened by testosterone or oestrogen.

"It could be because horses have reasonably good socialisation from a young age, with their dams and other horses, so they don't need testosterone to feel confident. Whereas dogs are often raised in single dog households and lack confidence

when taken to a park full of other dogs."

CASTRATION RISKS

ALTHOUGH many castrations are carried out, James says it shouldn't be undertaken lightly and consideration should be given to best practice.

"Castration is an elective procedure with a high rate of complications [vet clinic, 31 July 2025]. Post-castration, swelling, bleeding or other complications can be reasonably common. It's quite daunting for vets to perform a procedure where you know you have a high complication rate, regardless of technique."

A vaccination that could be an alternative to surgical castration has been used with some success. However, it's currently not available for

The pituitary gland in the brain triggers the release of hormones

"Testosterone is part of a 'negative feedback loop'"

use in horses, meaning that any use is "off licence". It acts on the GnRH, which signals to the pituitary gland to release the hormones that stimulate the ovaries and testes, essentially limiting testosterone production (and oestrogen production in mares) from further up the hormonal chain.

"The GnRH vaccine is really interesting," says James. "Anecdotal evidence suggests that it may suppress more than surgical castration, as it acts on a greater number of hormones. Also, its use is not without some significant risks.

"In some cases, the vaccine could be used for a time and

you could still breed from the horse in the future, but there are no guarantees and its effect should practically be considered irreversible. Most people, if they want the stallion to have a breeding career later, will collect semen and freeze it first and then castrate, either surgically or chemically." **H&H**

● *Clarification: a library photograph of a lungeing aid was used in our 20 August Vet Clinic feature. The feature considered research relating to training aids generally and did not assess or make claims about the specific product pictured. As the article explained, the effect of any training aid depends on the individual horse and how it is used*

NEXT WEEK

Wearable technology and how it is helping racing vets

Pictures by Alamy and courtesy of Bell Equine