



MEET THE EXPERT

GILLIAN HIGGINS is an equine sports and remedial therapist, BHS senior coach, biomechanist, anatomist and anatomical artist. Her business *Horses Inside Out* runs courses on understanding anatomy and biomechanics. Visit horsesinsideout.com.

The back story

Consisting of up to 57 vertebrae, your horse's spine runs from the top of his neck all the way to the end of his dock. **Gillian Higgins** takes a fascinating journey from head to tail

HAVING A GRASP of where all the bones are in your horse's body is good knowledge to have, but perhaps the more interesting bit is learning how they work together and influence your horse's way of going. Gillian Higgins from *Horses Inside Out* covered this topic at a recent one-day seminar at Moulton College. "You'll have heard the saying – if you don't use it, you lose it," says Gillian. "Well, to keep your joints healthy, it's important they keep moving and it's

the same for your horse." Gillian goes on to explain that the spine is made up of up to 57 vertebrae, and these little building blocks fit together like lego. They run from your horse's head to his tail and, as you move along the spine, the size and shape of the vertebrae changes. This means there's different movement and slightly different functions on different parts of the spine. To kick start this fascinating new series, Gillian takes you for a tour along your horse's spine and explores each section in more detail.



THE FIVE SECTIONS OF THE SPINE

Sacral (five vertebrae)	Lumbar (six vertebrae)	Cervical (seven vertebrae)
Tail (15–21 vertebrae)	Thoracic (18 vertebrae)	

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1 Cervical vertebrae

Many people think the neck vertebrae run along the top or middle of the horse's neck, but they are much lower down than that. This positioning is because the head is a very heavy structure on the end of a very long lever – the neck. This area needs to be filled with strong ligaments and muscles to help him hold his heavy head off the ground.

The greatest amount of movement within the neck is at the very top and bottom. The movement at the top of the neck is all about moving the head relative to the neck. The movement at the bottom of the neck is about moving the head and neck relative to the rest of the horse's body.

Nodding mechanism

The first joint between the skull and the first cervical vertebra allows your horse to nod his head (flexion and extension). There's no other joint in the spine that shows this much flexion and extension.

To see how much movement there is at this joint, ask your horse to extend his head up. You can do this using a carrot – hold it on his lips and lift his head up. Then you can ask him to flex his head inwards too. As you do this you'll see most of the movement to create the nodding action is coming from the skull and the first cervical vertebra.



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Your horse can extend his head up a long way – ask him to do it using a carrot

Lateral flexion

The second joint between the first and second cervical vertebrae is all about rotation. This side to side movement (or lateral flexion) at the poll is very much just the head moving from side to side. There's not a huge amount of movement here. When you say lateral flexion, many people ask for too much bend lower down in the neck, when actually it's very subtle – you should be able to see your horse's eye on the inside.

How flexion and extension work together

When your horse has his head up in full extension or flexion, the amount of lateral flexion reduces. It's when this joint is in the mid-range of flexion and extension that you will get optimum lateral flexion.

Understanding the anatomy of this area is really useful, particularly when you're thinking about working your horse in different outlines.



You and your saddle sit on the thoracic vertebrae

2 Thoracic vertebrae

The thoracic section of the spine is essentially the area where the rider sits.

There are very long bony projections that come out of the top of each vertebra called the spinous processes. Again, it's quite surprising that these vertebrae are positioned lower down than you might think. When you run your fingers along the mid-line of the back, you're touching the top of the spinous processes – these are longest at the withers to provide an area for muscle attachment and for leverage.

The other unique thing about the thoracic section is that the ribs attach in between the thoracic vertebrae. These are all individual joints. Most movement of the ribs happens at the back part – these can be called the breathing, or bending, ribs. The front section of the ribs is almost like a cage – they are sometimes referred to as the true ribs and attach onto the sternum.

Overall, there isn't a huge amount of lateral flexion in the horse's back – it's the ribs that contribute to his ability to bend.



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Encouraging your horse to move his ribs will have a positive effect on his back too

"In walk, ride a 10m circle and do it with your eyes closed – you'll feel your horse bending around your inside leg but actually that feeling of bending comes from the movement of his ribs," says Gillian.

Mobilising the ribs

By encouraging your horse's ribs to move, it will help to supple and mobilise his back too. Try the in-hand exercise on the right every day to really get your horse's ribs mobilised.

3 Lumbar vertebrae

This is the area directly behind where your saddle sits and consists of six vertebrae. There's very little movement between these vertebrae and each of them has very long bony projections coming out of each side called the transverse processes. These provide a really important area for muscle attachment. It's a connection point from the hindlegs through to the back.

"If you've seen a horse with muscle soreness in this area, perhaps on one side more than the other – this soreness may well be coming from the hindleg, rather than actually starting in the lumbar region, as the two areas are connected," explains Gillian.

"Movement stimulates the production of joint fluid and this helps with joint mobility. So, moving the ribs has a positive effect on the mobility and health of the back" Gillian Higgins

1 In-hand lunge your horse in walk on a small circle – about 3m.

2 You want to see his front front feet stepping forwards and turning – for the front feet and the hind feet and the hind feet.

3 If your focus is on pushing the hind end round, all that happens is the front end stops and pivots and then the hind leg can't step under and across.

4 What you should see during this exercise is your horse's ribs getting closer together on the inside of the bend and seeming to get wider on the outside of the bend.

5 The whole barrel of the ribs swings to the outside more than to the inside due to the placement of the hindleg.

6 Each time the hindleg comes under the body, you should see the ribs swing to the opposite side.

7 Lunge three circles one way and then three circles the other way.

4 Sacral vertebrae

The five sacral vertebrae are all fused together, meaning there's no movement in this area. However, it's at the junction between the last lumbar vertebrae and the sacrum – the lumbar sacral junction – that you'll see the most flexion and extension within your horse's spine (excluding the neck and tail), compared to the rest of the back. You're

looking at a maximum of 24 degrees of flexion and extension in this area.

It's this range of movement that allows your horse to canter, gallop, jump and do all those fancy collected dressage moves. If he didn't have this range of movement here, he wouldn't be able to do that – it's this junction within the spine that allows the hindlegs to step underneath his body.

5 The tail

This final section of the spine starts with three tail vertebrae within the hindquarters before you reach the dock.

There are also many muscles, tendons and ligaments in the horse's back that continue into the tail. This means the positioning of the tail could be an indicator of health

further forwards within the back, and it can also be an indicator of straightness.

If your horse suddenly starts to clamp his tail or holds it to one side, he could be telling you something has changed or something is wrong and it would be well worth getting this area checked out. 🐾



It's the range of movement in the sacrum that allows your horse to jump

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NEXT MONTH: How to promote good back posture