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Photo: (bitless bridle?)

TITLE: Who Needs Bits?

With Dr. W. Robert Cook

In today's horse world, we have a delightful trend toward keeping it natural while at the same time 'unnaturally' riding these powerful animals that once roamed free. Their natural instincts remain, but their amiable natures allow us to harness their power and enjoy the pleasure of their company.

Riding or driving these magnificent creatures involves the risk of causing them harm by using, for example, ill-fitting saddles and harness. The knowledge we have gained from research, however, has enabled us to choose our equipment more wisely, with the horse's best interests in mind.

Another area of equipment that has been researched is the bridle, or more particularly, the bit. The snaffle bit has come to be accepted as kind, with shank and port bits being regarded as unkind. But do we need a bit at all? When we have the likes of Pat Parelli and Robin Brueckmann achieving Olympic level riding without even a bridle, who needs bits? Furthermore, do bits actually cause harm?

Veterinarian and researcher Dr. W. Robert Cook has uncovered some very interesting findings regarding the effects of the bit on the horse's mouth and also on the whole of the horse. What Dr. Cook has found is that a bit is actually detrimental, in various ways, from subtle to profound. His discoveries have led to the use of a new design of bitless bridle, which has been developed according to his specifications, to act upon the whole of the head, without causing the horse either pain or physiological confusion. His research has revealed that the use of a bit to control a horse at exercise is contradictory, and potentially harmful to the health and safety of both horse and rider.

Natural locomotion

To begin with, Dr. Cook, F.R.C.V.S, PhD, Professor of Surgery *Emeritus* of Tufts University, School of Veterinary Medicine, explains, "A galloping horse breathes entirely through its nose and in time with its stride. The mouth is closed. As the leading foreleg meets the ground, the head and neck swing downward like a pendulum, the contents of the abdomen slump forward - pressing on the diaphragm - and the horse breathes out. The lowered position of the head stretches the elastic 'rope' (the ligamentum nuchae) that connects the back of the skull to the withers and the remainder of the spine. Tension on this 'rope' raises the pelvic end of the spine. The momentum generated by this head/neck pendulum (the 'head bob'), in elevating the pelvis, starts the horse's hind legs on their forward swing, with no expenditure of muscle energy. As the hind legs

become weight bearing, the ligamentum nuchae recoils, pulling the horse's head up again. The abdominal contents slide back toward the pelvis, flattening the diaphragm, and the horse breathes in. At the same time, elevation of the head starts the forelegs on their forward swing. Thus the 'head bob' serves as an energy-conservation mechanism that reduces the work of breathing and locomotion. It enables a horse to gallop economically and to tire less quickly."

He continues, "At least, that is how a horse gallops **when at liberty**. A ridden horse, however, almost always has a bit in its mouth. The bit," says Dr. Cook, "often causes the horse pain, interferes with the 'head bob', upsets the natural synchrony between breathing and striding, and breaks the normal seal of its lips. Because of these effects the bit is often responsible for premature fatigue and a long list of disorders. These include the familiar package of problems under the heading 'non-acceptance of the bit' but also problems that have not previously been recognized as being caused by the bit." Dr. Cook places at the top of this list the "frequent and very understandable loss of that spirit of cooperation that most horses so willingly give and upon which a partnership between horse and rider so utterly depends." Other problems include headshaking, difficulty in breathing ('thickness of wind', 'roaring,' soft palate problems, epiglottal entrapment, dynamic collapse of the windpipe, and bleeding from the lung), premature fatigue, loss of balance, stiffness of gait, and poor performance.

#### Bits - detrimental and counter-productive

"Man has used a bit to control the horse for 6,000 years," says Dr. Cook. "It is hard for us to accept that we have been wrong for so long, but my recent research indicates that a bit is not only unnecessary for control of the horse but is actually contraindicated, counter-productive, and often cruel. It sets off a cascade of events that can harm the horse from head to hoof."

The bit, Dr. Cook points out, is an unforgiving foreign body in an exquisitely sensitive body cavity. "It seemingly controls the horse," he says, "at the risk of causing pain, excess poll flexion, partial suffocation and many accidents. Because the horse can evade the rider's pull on the bit by putting the bit between its teeth or under its tongue, a rider dependent on these attempts at control can – with alarming ease – be entirely deprived of any control. Bit-induced pain is a cause of problems such as this, as well as bolting, rearing, bucking, head shaking, napping, balking, stumbling, pulling and jiggling, to mention but a few. Finally, though it has long been known that the bit has many pernicious effects on the horse's mouth, its more wide-ranging and adverse effects on the respiratory, musculo-skeletal and nervous systems have been overlooked."

Dr. Cook evaluated the bit in relation to his previous studies of the applied anatomy of the upper airway (see bibliography below). "The focus of my research," he said, "has been the head, neck and chest of the horse, so my

recent study of the bit's effects on the physiology of exercise represents a continuation of a life-long interest in this region." Among other investigations, he 'scoped' three bitted horses at rest and during treadmill exercise, noting the airway obstruction caused by bit-induced tongue and jaw movement. Dr. Cook also ran exercise trials with four 'roarers', first with a bit in their mouths and then with what is now called The Bitless Bridle (Allan Buck, a dressage trainer in California, developed an early version of the current bridle from an existing halter and, in 1987, Dr. Cook endorsed it) noting the lessening of the noise or even its elimination when the bit was removed.

A pilot trial, by an endurance rider using global positioning system equipment, showed that when the bit was removed and the bitless bridle used, the horse habitually clocked faster speeds at the walk and the trot. Further trials are now taking place.

#### Bone spurs on bars - a cause of headshaking

According to Dr. Cook, it is well known that the cheek pieces of the bit can press the lining of the cheek (the buccal mucosa) against the sharp enamel edges of the cheek teeth, causing painful buccal ulcers. It is equally well known that use of the bit is frequently responsible, whether accidentally or by misuse, for injury to the lips, bruising of the gums, laceration and even amputation of the tongue, fractures of the mandible and injuries to the hard palate. What has not been known is that use of the bit frequently causes bone spurs to develop on the bars of the mouth.

At the Natural History Museum (Smithsonian) and the Museum of Comparative Zoology (Harvard University), Dr. Cook surveyed 48 skulls from horses that were 5 years old or older for evidence of bone spurs on the mandible caused by the bit. He compared these with 20 mature zebra skulls. None of the zebra skulls showed any abnormality on the bony 'bars' of the mouth. Five Przewalski horses that had died in the National Zoological Park and eight feral horses from Assateague Island also showed no abnormality, as one might have expected. But of the remaining 35 horse skulls, bone spurs on the bars of the mandible were present in 26 (74%). The famous Thoroughbred racehorse 'Lexington' was one of the 26. A few skulls also had bone spurs on the maxilla.

The excruciating pain that these bone spurs must cause lends credence to Dr. Cook's hypothesis that bit-induced facial pain (trigeminal neuralgia or *tic douloureux*) is the most common cause of the headshaking syndrome in the horse. As its name implies, the trigeminal nerve has three branches; mandibular, maxillary and ophthalmic. All the symptoms comprising this syndrome are, he points out, consistent with the hypothesis that the bit is responsible, directly or indirectly, for pain in one or more of these branches.

Dr. Cook explains, "The head tossing and stumbling, for example, can be explained as a central response to severe shooting pains originating in the mandibular branch of the nerve. The head rubbing, sneezing and snorting are signs compatible with 'pins and needles' or frank pain, referred from the mandibular to the maxillary branch, which supplies sensation to the face and nostrils. Finally, the rapid blinking and sensitivity to bright light is consistent with pain referred from the mandibular to the ophthalmic branch." Unlike the competing hypotheses of allergic rhinitis and light-related headshaking, however, the trigeminal neuralgia hypothesis is easy to test - removal of the bit should significantly alleviate or banish the symptoms. Happily, Dr. Cook reports that such is the case and that removal of the bit is the most rewarding treatment he has yet discovered for this recalcitrant problem. Removal of the bit should, in his opinion, be the first step in the clinical work-up of these cases. The validity of a tentative diagnosis of bit-induced trigeminal neuralgia can, he says, be judged by a rewarding response to elimination of the bit.

#### Windpipe distortion discovered

Some years ago, Dr. Cook supervised a veterinary student's slaughterhouse survey of windpipe conformation in 51 horses. All horses were found to exhibit varying degrees of dorso-ventral flattening of the windpipe (scabbard trachea) at some point on their length, particularly at the entrance to the chest.

Twenty-two of 47 windpipes (47%) were flattened throughout their length. He now suggests that bit-induced obstruction of the airway at the level of the throat may be the cause of these common deformities. He believes that the cascade effect resulting from such a deformity would render lung bleeding and poor performance more likely.

#### Weight of bits detrimental

Dr. Cook weighed various bits and bit combinations. He found that their weight ranged from 6ozs (180g) for a pony snaffle to 26ozs (780g) for the combined weight of the bits and curb chain in a double bridle. The bridle and bits for a Standardbred racehorse weighed in the region of 6 lbs (2.8 kg). Dr. Cook wonders whether trainers fully realize that they are handicapping the front end of their horses with so much 'lead'.

#### Two nervous systems in conflict

"As soon as a bit is placed in the mouth," says Dr. Cook, "the horse is being signaled to think 'eat.' The lip seal is broken; the horse begins to salivate and to move its lips, jaw, and tongue. These are digestive system reflexes, dominated

by the parasympathetic nervous system, which initiates all responses to do with rest and relaxation. When a rider mounts, however, the sympathetic nervous system is also triggered. The horse is now being signaled to think 'exercise'. Accordingly, an opposing set of fight-and-flight responses is initiated."

"Therefore," Dr. Cook concludes, "bitted horses are being expected - quite unreasonably - to give of their best in terms of athletic performance with these two nervous systems in conflict. The horse is not 'designed' to eat and exercise at the same time and is neurologically confused by the competing signals. The switch-plate anatomy of the throat is such that the soft palate and other parts of the throat can be configured for either eating or exercise but not for both concurrently."

### Respiration impeded

"For swallowing, the soft palate has to be in the 'up' or dorsal position. Conversely, for deep breathing, the soft palate has to be in the 'down' or ventral position. Use of the bit, which encourages the dorsal position, leads to many pharyngeal problems, gagging reflexes, difficulties in breathing, and - less obviously - difficulties in striding," Dr. Cook explains. "A cantering or galloping horse takes one stride for every breath. Because of this, anything that interferes with breathing also interferes with striding. As the bit breaks the lip seal, air enters the oral cavity. Helped along by movement of the tongue and jaw at exercise, the air creeps upward and invades the oropharynx, the digestive part of the throat, the roof of which is the soft palate. Because the soft palate floats upward on its bubble of air, this reduces the diameter of the nasopharynx, the respiratory part of the throat. Restriction of the airway from this simple elevation of the soft palate results in partial asphyxia, which may progress to intermittent 'thickness of wind' or even a more permanent 'roaring' noise (laryngeal stridor)."

Dr. Cook continues, "At fast exercise, this bit-induced elevation of the soft palate can also lead to 'dorsal displacement of the soft palate' (DDSP) and epiglottal entrapment." DDSP is a complete separation of the soft palate seal at the base of the epiglottis. When this happens to a racehorse it is said to have 'swallowed its tongue'. Such a horse 'gurgles', 'chokes-up' and is incapable of continuing to race because of suffocation. 'Roaring' and DDSP also follow from the horse seeking to evade the bit by retracting the tip of its tongue behind the bit. In this situation it is the root of the tongue that pushes the soft palate up. Exposure of the oropharynx to the drag of the inspiratory vacuum," he explains, "is the cause of epiglottal entrapment."

Poll flexion, so easily brought about by the bit, is another cause of upper airway obstruction at fast exercise. Cook has already published evidence indicating that upper airway obstruction, from any source, is a cause of bleeding from the lung (EIPH or exercise-induced pulmonary hemorrhage). He now adds the bit to this

list of sources. In terms of importance he places it at the top of the list, ahead of recurrent laryngeal neuropathy (laryngeal paralysis).

In articles written since 1997, Dr. Cook lists a dozen more problems to do with difficulty in breathing, poor striding and unacceptable behavior that have not previously been recognized as being caused by the bit. All of these problems can be solved, according to Dr. Cook, by removing the bit. He comments that it is ironic in view of the bit's long tradition that this Bronze Age device has now to be recognized as an impediment to performance.

These findings, coupled with an understanding of the amiable and cooperative nature of the horse, make it hard to consider a bit anything but detrimental to the horse and rider.

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*For more information:*

The Bitless Bridle  
2020 South Queen Street  
York, PA 17403-4829  
866-235-0938  
www.bitlessbridle.com

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(The last five articles are available online at [www.bitlessbridle.com](http://www.bitlessbridle.com). The article published in Germany has been translated into English.)