Blood Pumping Mechanism of the Hoof

Blood is pumped from the heart through arteries to the hoof and is assisted in its return through a “pumping mechanism” in the hoof. This mechanism is necessary due to the position of the hoof in relation to the heart. There are no muscles in the lower leg or hoof to aid in the return of venous blood to the heart. Thus, the hoof has to pump venous blood back to the heart.

Large venous plexuses are located on both sides of each of the lateral cartilages and in the sensitive structures of the foot. Each venous plexus is made up of an extensive network of veins. The compression of these veins by the plantar cushion against the lateral cartilages or the coffin bone against the hoof acts as a “pump” to force the blood up the leg and back to the heart.

Blood is prevented from returning to the foot by one-way valves in the veins of the leg. Compression of the plexuses also acts as a valve to contain blood in the vessels of the hoof below the plexuses. This produces a “hydraulic cushion” that further dissipates concussion and protects the fragile coffin bone.

This valve action also creates a fluid pressure that, when the foot is raised and the compressed veins are open, causes the blood to exit up the leg and the plexuses to fill. Each time the foot bears weight, the veins are compressed. Each time the foot is raised, the veins open, and blood is pushed in by the arterial pulse and gravity. The weight of the horse forces the blood back up the leg, which is commonly referred to as the second heart.