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**Veterinary Technician's  
Large Animal Daily  
Reference Guide**

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# Chapter 1

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## Anatomy

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### INTRODUCTION

In relation to large animal species, anatomy plays an integral role in how the body works. As technicians, we should be familiar with how the body is put together and the vital functions of each structure. There are nine basic animal systems that we study: the integumentary system, the musculoskeletal system, the cardiovascular system, the lymphatic system, the respi-

ratory system, the digestive system, the nervous system, and the genitourinary system.

This chapter will give a basic overview of each system and the specific anatomical structures that are important to recognize in various large animal species (Table 1.1). In addition, this chapter includes a detailed description of equine conformation and its relation to structural abnormalities.

Table 1.1 / Systems Overviews

System Name	Anatomical Structures	Functions
Integumentary	<ul style="list-style-type: none"> <li>• Epidermis</li> <li>• Dermis</li> <li>• Hypodermis or subcutaneous layer</li> <li>• Hair</li> <li>• Glands of the skin</li> <li>• Claws/dewclaws</li> <li>• Hooves</li> <li>• Horns</li> </ul>	<ul style="list-style-type: none"> <li>• One of the largest and most extensive organ systems in the body</li> <li>• Composed of 4 tissue types</li> <li>• Covers and protects underlying structures within the body</li> <li>• A critical barrier to the harsh outer world</li> </ul>
Musculoskeletal	<ul style="list-style-type: none"> <li>• Bone</li> <li>• Axial skeleton</li> <li>• Appendicular skeleton</li> <li>• Joints</li> <li>• Skeletal muscle</li> <li>• Cardiac muscle</li> <li>• Smooth muscle</li> <li>• Tendons</li> </ul>	<ul style="list-style-type: none"> <li>• The framework of the body that supports and protects soft tissues within the body</li> <li>• Provides movement and some body functions</li> </ul>
Cardiovascular	<ul style="list-style-type: none"> <li>• Heart</li> <li>• Blood</li> <li>• Arteries</li> <li>• Veins</li> <li>• Capillaries</li> </ul>	<ul style="list-style-type: none"> <li>• Regulates body functions and delivers oxygen, antibodies, inflammatory cells, and nutrients throughout the body</li> <li>• Removes waste from tissues</li> <li>• The heart pumps blood throughout the vessels to maintain body function.</li> </ul>
Lymphatic	<ul style="list-style-type: none"> <li>• Plasma</li> <li>• Red blood cells</li> <li>• Platelets</li> <li>• White blood cells</li> <li>• Lymphatic fluid</li> <li>• Immune components</li> </ul>	<ul style="list-style-type: none"> <li>• Transport system</li> <li>• Cellular metabolism</li> <li>• Assists in immune response</li> <li>• Aids in homeostasis</li> </ul>
Respiratory	<ul style="list-style-type: none"> <li>• Upper respiratory tract</li> <li>• Lower respiratory tract</li> <li>• Lungs</li> <li>• Thorax</li> </ul>	<ul style="list-style-type: none"> <li>• Responsible for the complex process of respiration and gas exchange within the body</li> <li>• Brings oxygen into the body and carries carbon dioxide out</li> </ul>

*(Continued)*

**Table 1.1 / Systems Overviews (Continued)**

System Name	Anatomical Structures	Functions
Digestive	<ul style="list-style-type: none"><li>• Oral cavity</li><li>• Esophagus</li><li>• Stomach (monogastric/ruminant)</li><li>• Small intestine</li><li>• Cecum (horses)</li><li>• Large intestine</li><li>• Rectum and anus</li></ul>	<ul style="list-style-type: none"><li>• Breaks down complex foods, such as hay and concentrates, into nutrient molecules and absorbs the nutrients into the bloodstream for the body's use</li></ul>
Nervous	<ul style="list-style-type: none"><li>• Neurons</li><li>• Central nervous system</li><li>• Peripheral nervous system</li><li>• Brain</li><li>• Spinal cord</li></ul>	<ul style="list-style-type: none"><li>• A complex communication system that monitors the body's internal and external environments and directs the activities of the body</li></ul>
Genitourinary	<ul style="list-style-type: none"><li>• Kidneys</li><li>• Ureters</li><li>• Bladder</li><li>• Urethra</li><li>• Testes</li><li>• Penis</li><li>• Ovaries</li><li>• Uterus</li><li>• Cervix</li><li>• Vagina</li><li>• Vulva</li></ul>	<ul style="list-style-type: none"><li>• There are multiple, combined functions of this system that include filtering of waste products from the body and eliminating them in various ways, as well as reproduction.</li></ul>



Figure 1.1 Conformation of a normal side view.

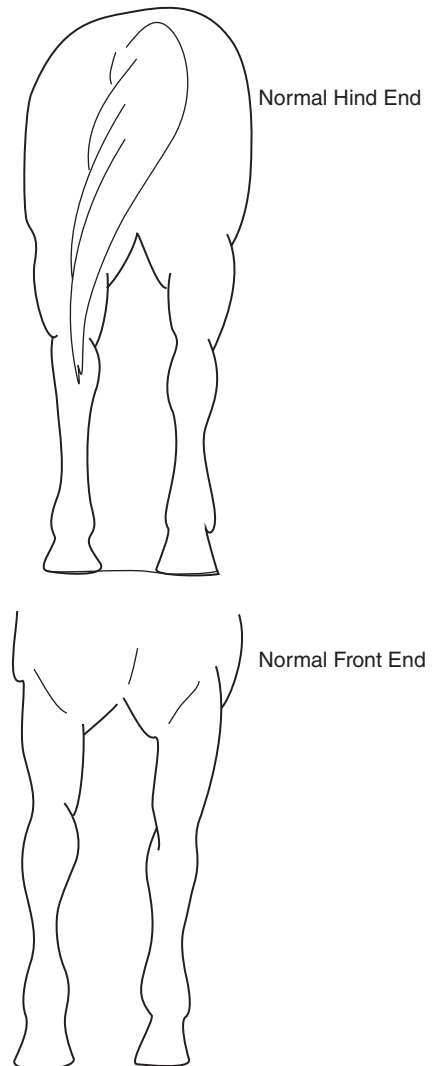
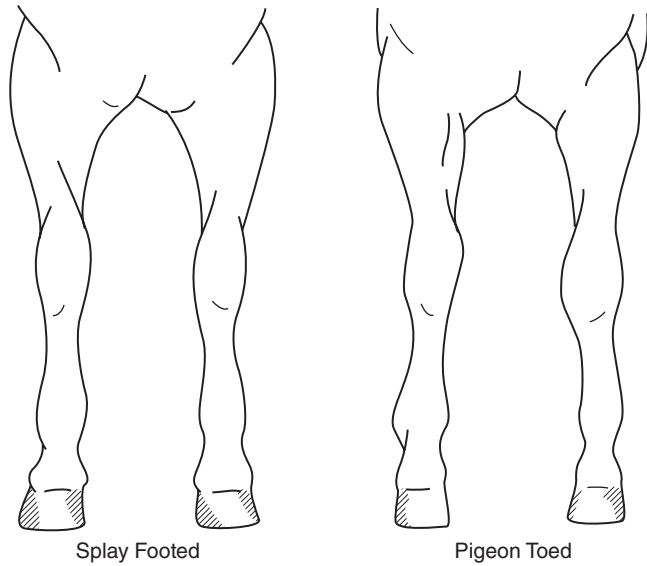
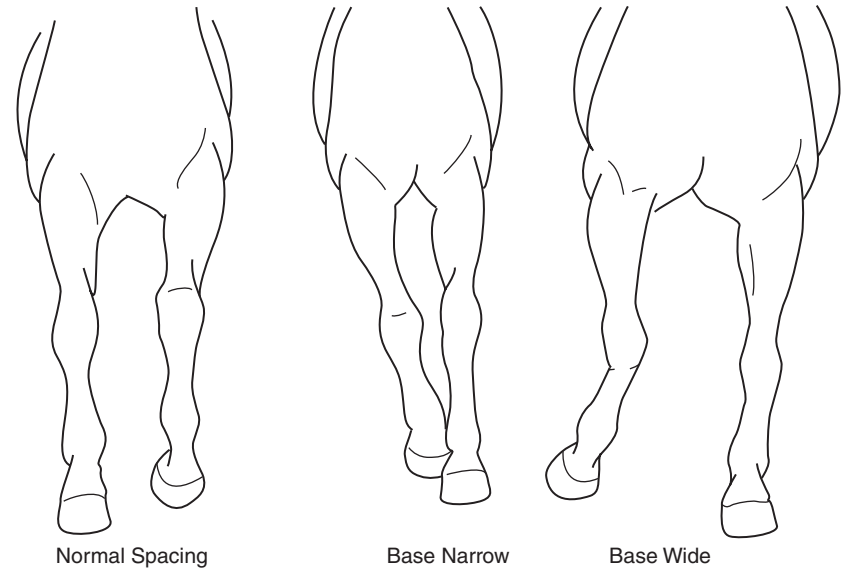


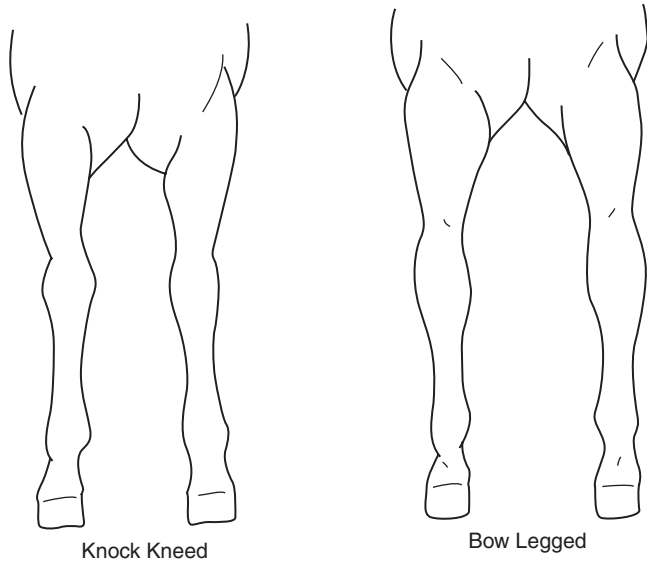
Figure 1.2 Conformation of a normal hind and front view.



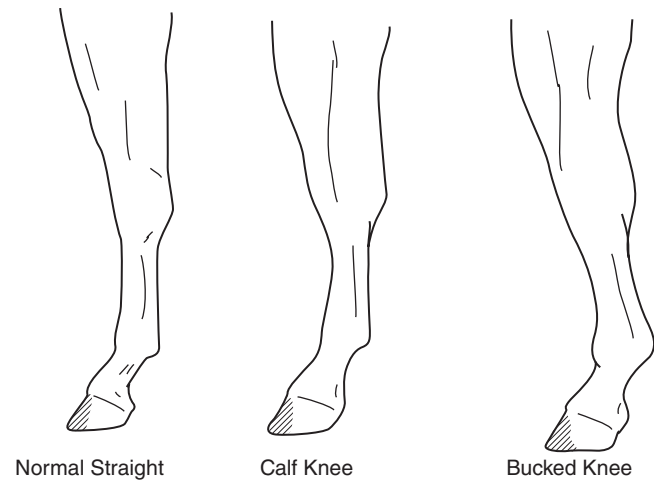
**Figure 1.3** Conformation faults in the forelimb of the horse.



**Figure 1.4** Conformation faults in the forelimb of the horse.



**Figure 1.5** Conformation faults in the forelimb of a horse (frontal view).



**Figure 1.6** Conformation faults in the hind limb of the horse (side view).

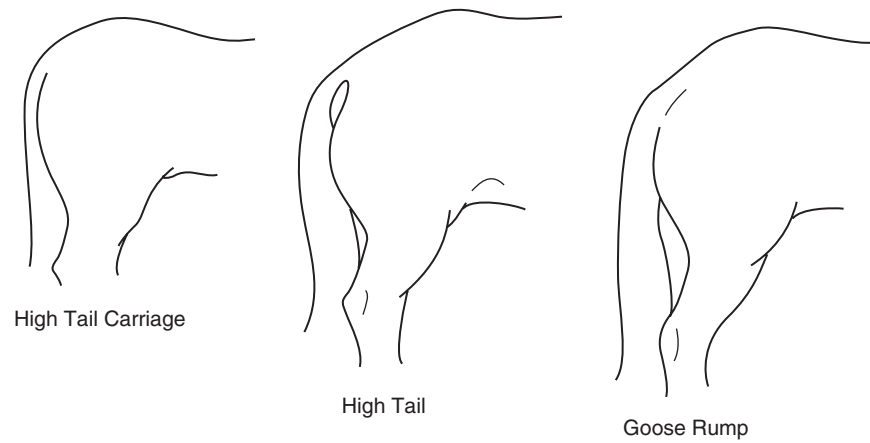


Figure 1.7 Conformation faults in the croup/hip of the horse (side view).

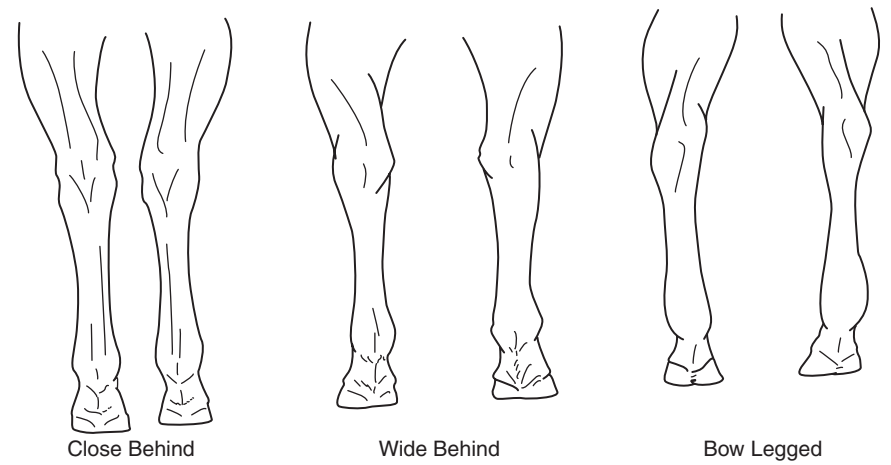
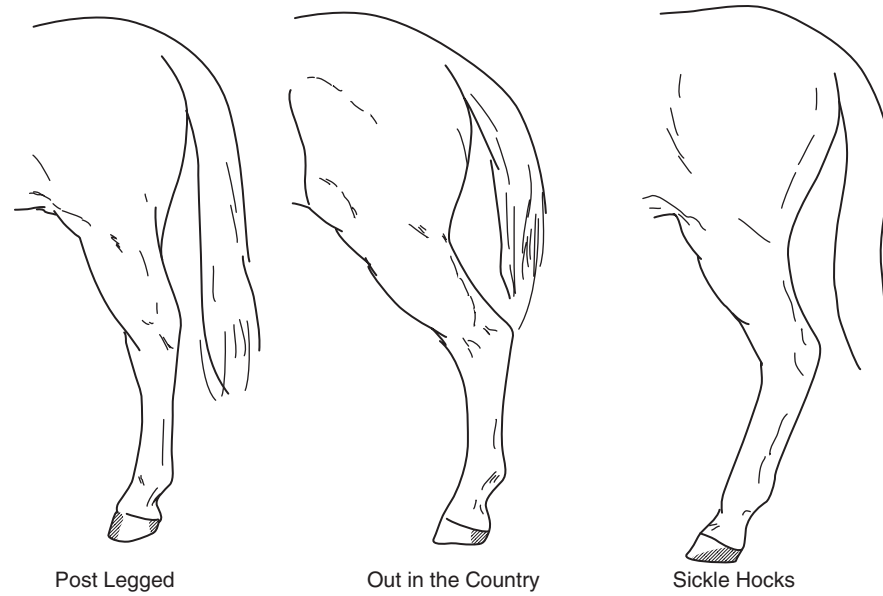


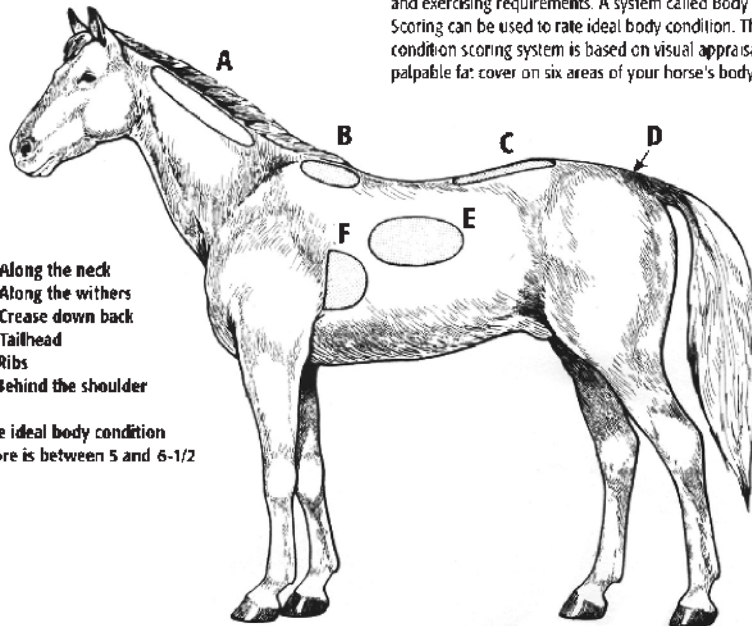
Figure 1.8 Conformation faults in the hind legs of a horse (back view).



**Figure 1.9 Conformation faults in the hind limbs of a horse (side view).**

## Body Condition Scoring

Many physiological functions in horses are influenced by body condition including horse's maintenance, reproductive and exercising requirements. A system called Body Condition Scoring can be used to rate ideal body condition. This condition scoring system is based on visual appraisal and palpable fat cover on six areas of your horse's body.



- A. Along the neck
- B. Along the withers
- C. Crease down back
- D. Tailhead
- E. Ribs
- F. Behind the shoulder

The ideal body condition score is between 5 and 6-1/2

### Description of Individual Condition Scores (Score 1-9)

1. **Poor:** Animal extremely emaciated; spinous processes, ribs, tailhead, tuber coxae (hip joints), and ischia (lower pelvic bones) projecting prominently; bone structure of withers, shoulders and neck easily noticeable; no fatty tissue can be felt.
2. **Very Thin:** Animal emaciated; slight fat covering over base of spinous processes; transverse processes of lumbar vertebrae feel rounded; spinous processes, ribs, tailhead, tuber coxae (hip joints) and schia (lower pelvic bones) prominent; withers, shoulders and neck structure faintly discernible.
3. **Thin:** Fat but dup about halfway on spinous processes; transverse processes cannot be felt; slight fat cover over ribs; spinous processes and ribs easily discernible; tailhead prominent, but individual vertebrae cannot be identified visually; tuber coxae (hip joints) appear rounded but easily discernible; tuber ischia (lower pelvic bones) not distinguishable; withers, shoulders and neck accentuated.
4. **Moderately Thin:** Slight ridge along back; faint outline of ribs discernible; tailhead prominence depends on conformation; fat can be felt around it; tuber coxae (hips joints) not discernible; withers, shoulders, and neck not obviously thin.
5. **Moderate:** Back is flat (no crease or ridge); ribs not visually distinguishable but easily felt; fat around tailhead beginning to feel spongy; withers appear rounded over spinous processes; shoulders and neck blend smoothly into body.
6. **Moderately Fleshy:** May have slight crease down back; fat over ribs spongy; fat around tailhead soft; fat beginning to be deposited along the side of withers, behind shoulders, and along sides of neck.
7. **Fleshy:** May have crease down back; individual ribs can be felt, but noticeable filling between ribs with fat; fat around tailhead soft; fat deposited along withers, behind shoulders, and along neck.
8. **Fat:** Crease down back; difficult to feel ribs; fat around tailhead very soft; area along withers filled with fat; area behind shoulder filled with fat; noticeable thickening of neck; fat deposited along inner thighs.
9. **Extremely Fat:** Obvious crease down back; patchy fat appearing over ribs; bulging fat around tailhead, along withers, behind shoulders, and along neck; fat along inner thighs may rub together; flank filled with fat.

Figure 1.10 Body condition scoring of the horse. (Reprinted with permission from AAEP's *Equine Manual for Veterinary Technicians*, published by Wiley Blackwell).

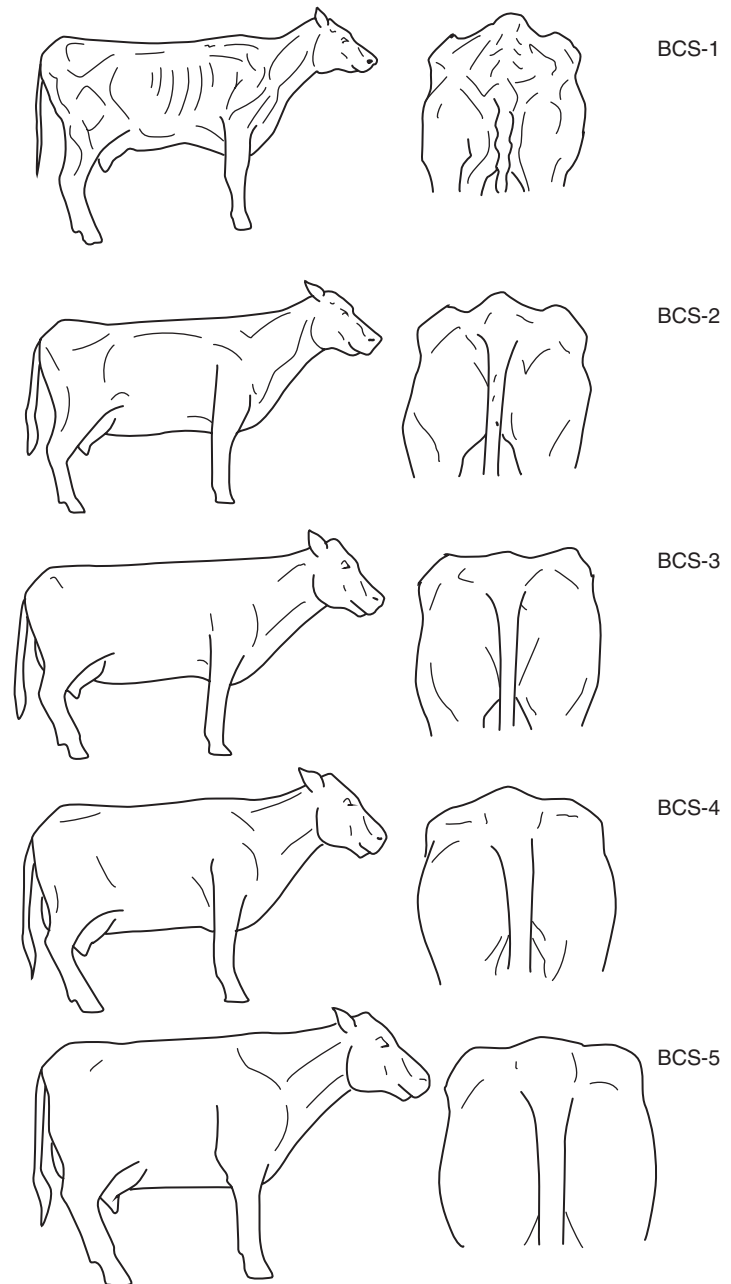
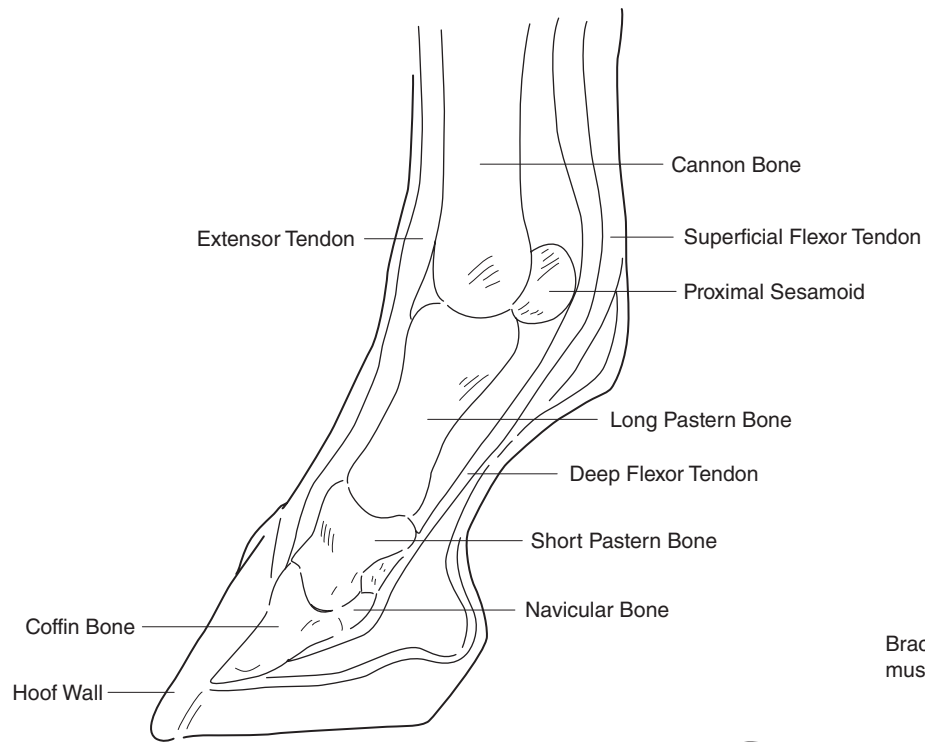
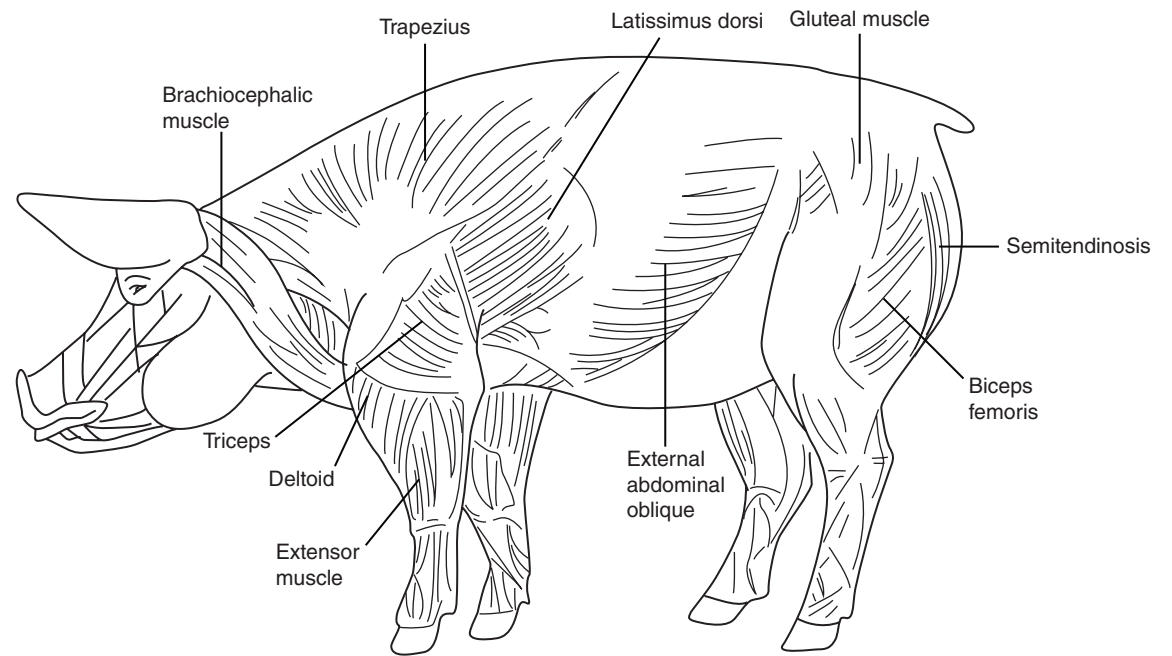


Figure 1.11 Body condition scoring chart of cattle.



**Figure 1.12 Lower limb bones of the horse.**



**Figure 1.13 Diagram of the superficial muscles of the pig.**

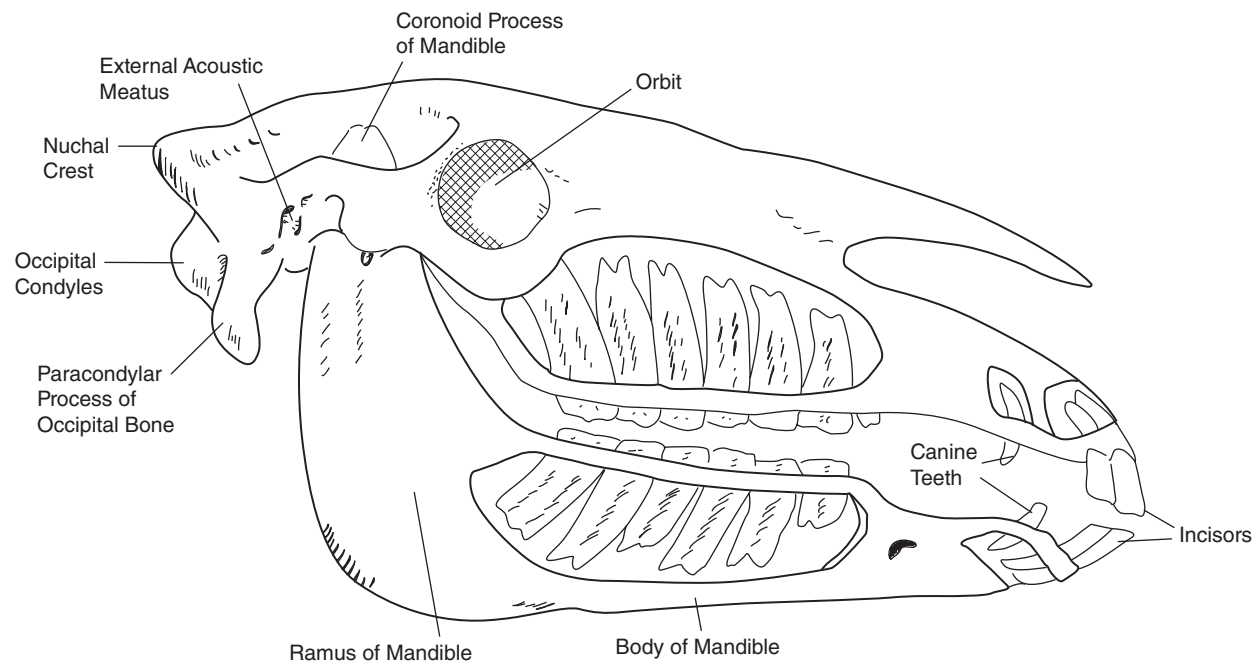


Figure 1.14 Equine skull.

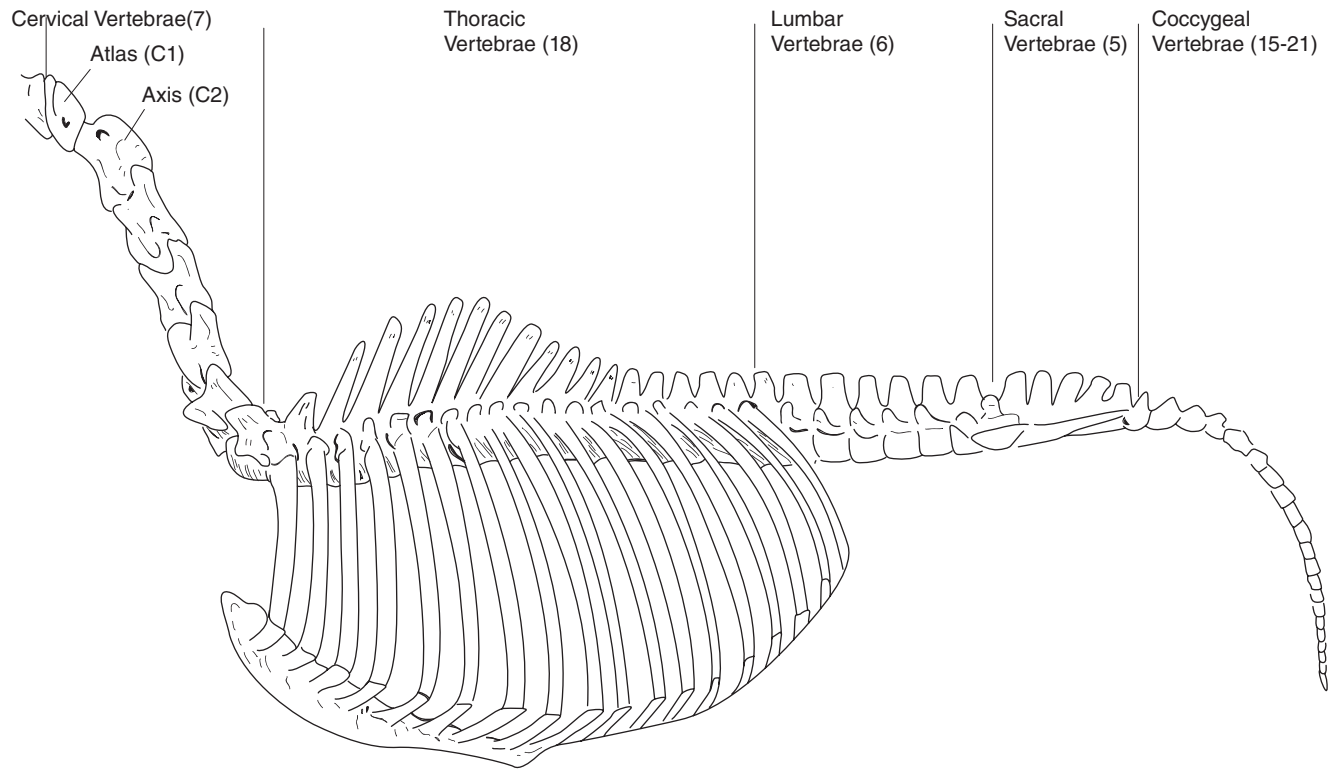


Figure 1.15 Equine spinal column.

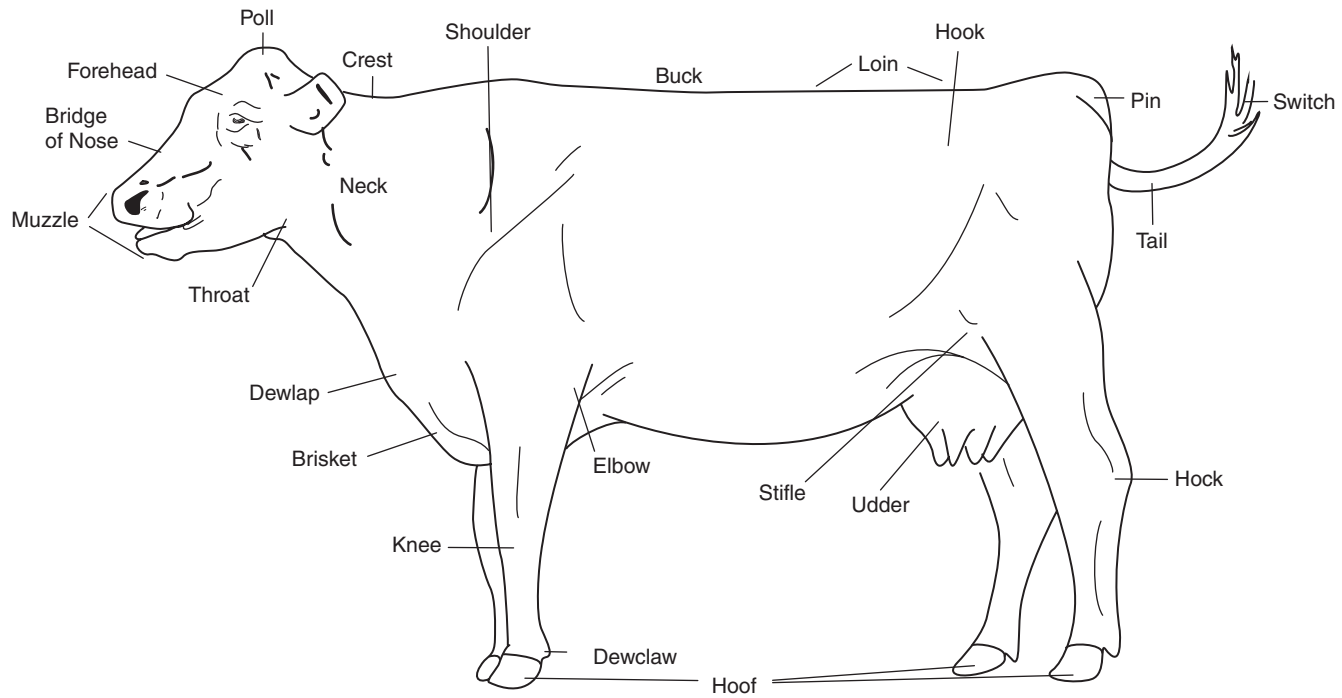


Figure 1.16 Diagram of the anatomy of the cow.

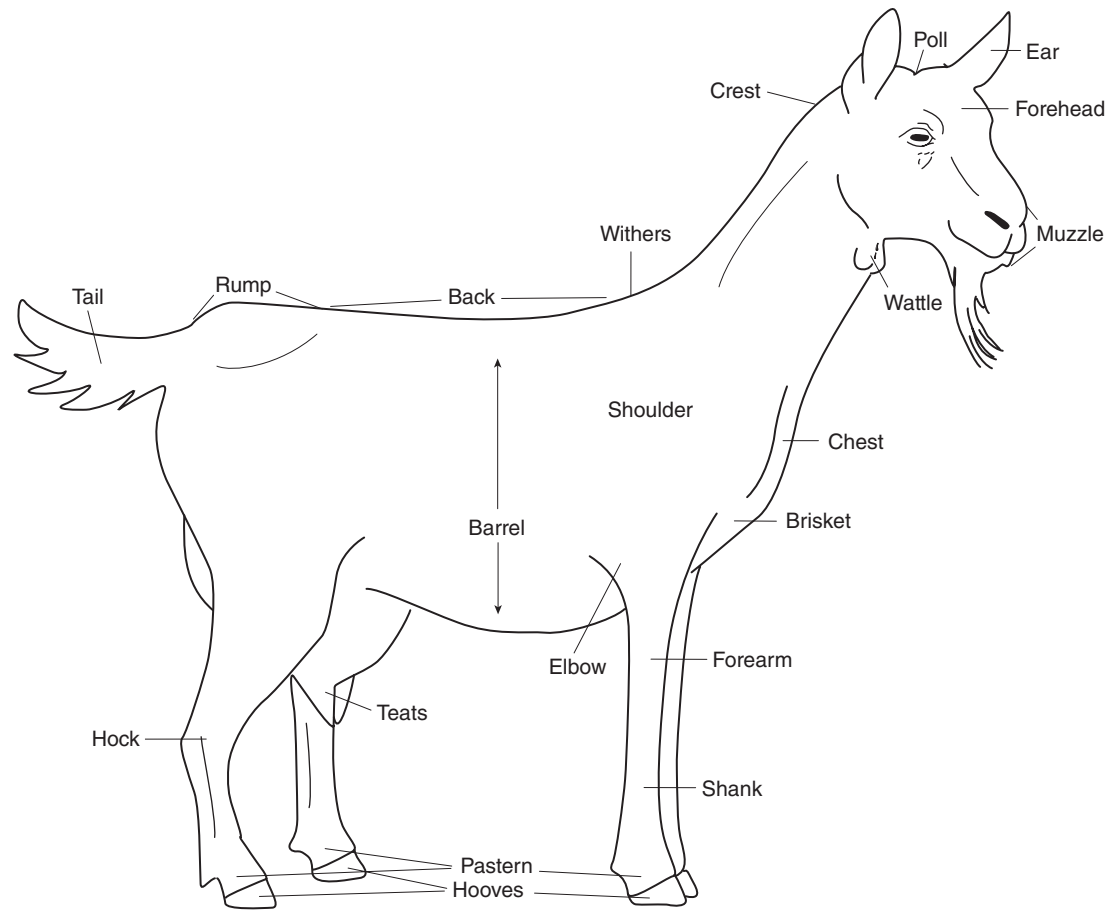


Figure 1.17 Diagram of the anatomy of the goat.

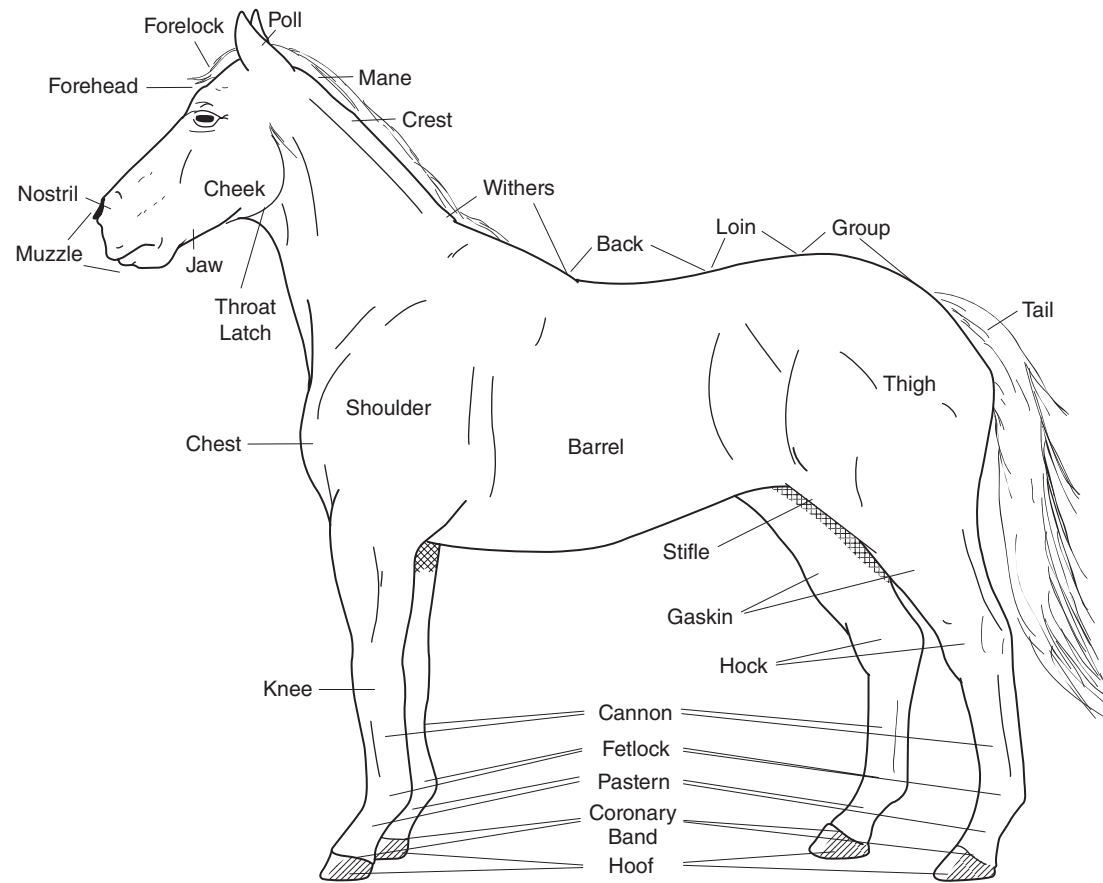


Figure 1.18 Diagram of the anatomy of the horse.

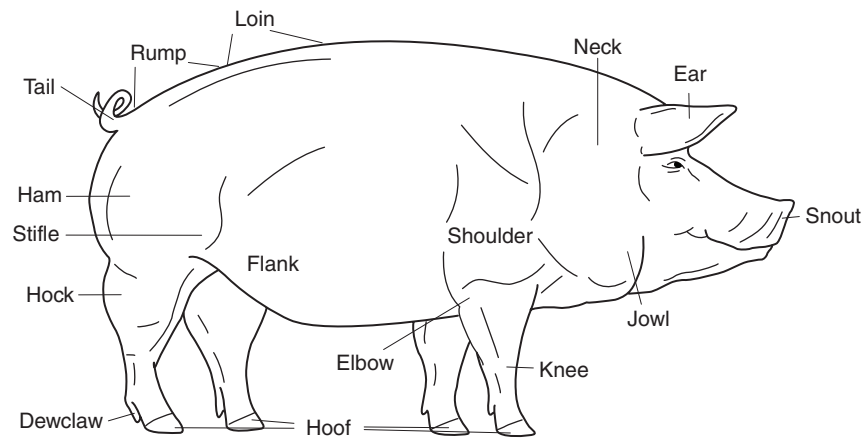


Figure 1.19 Diagram of the anatomy of the pig.

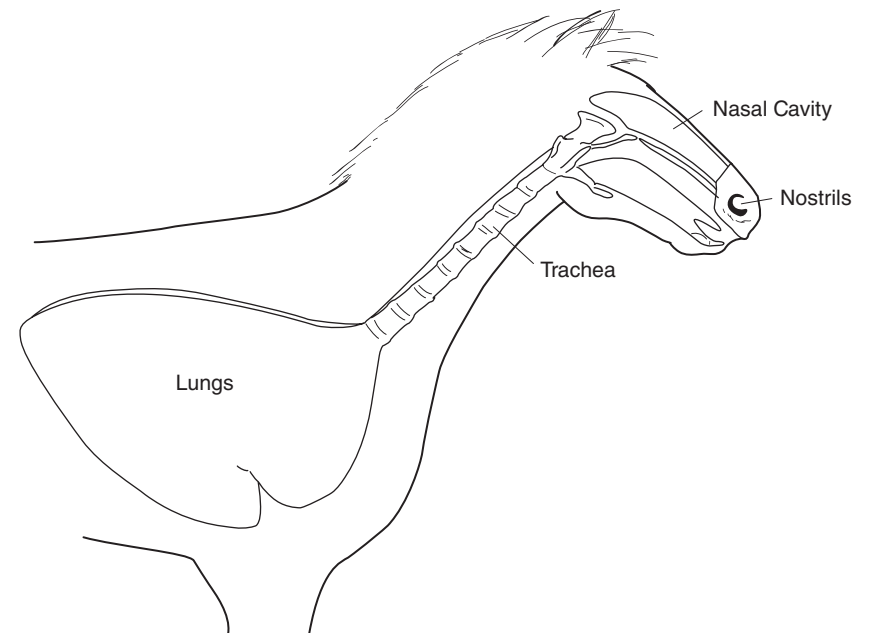


Figure 1.20 Lateral view of the respiratory tract of the horse.

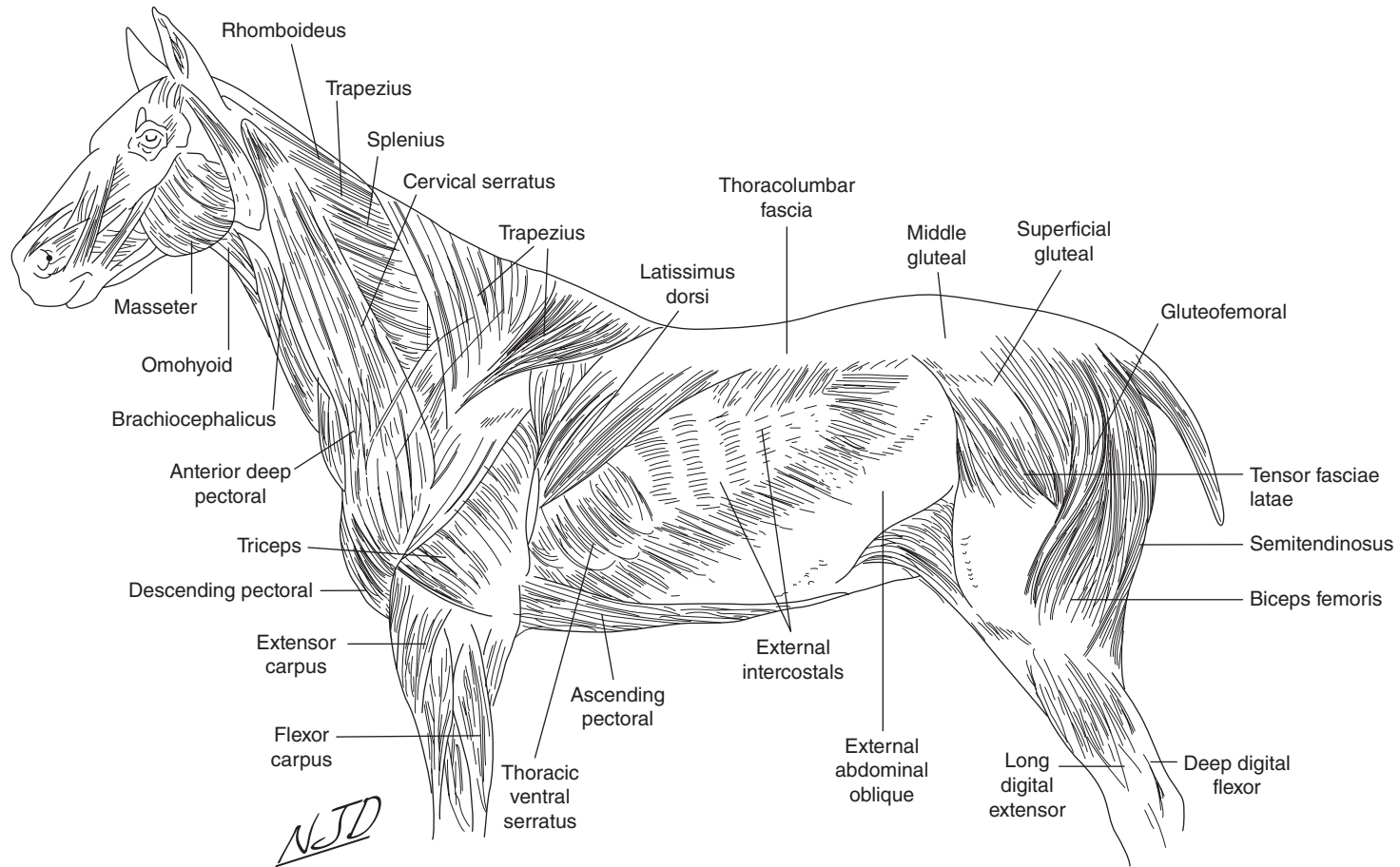


Figure 1.21 Equine muscles.

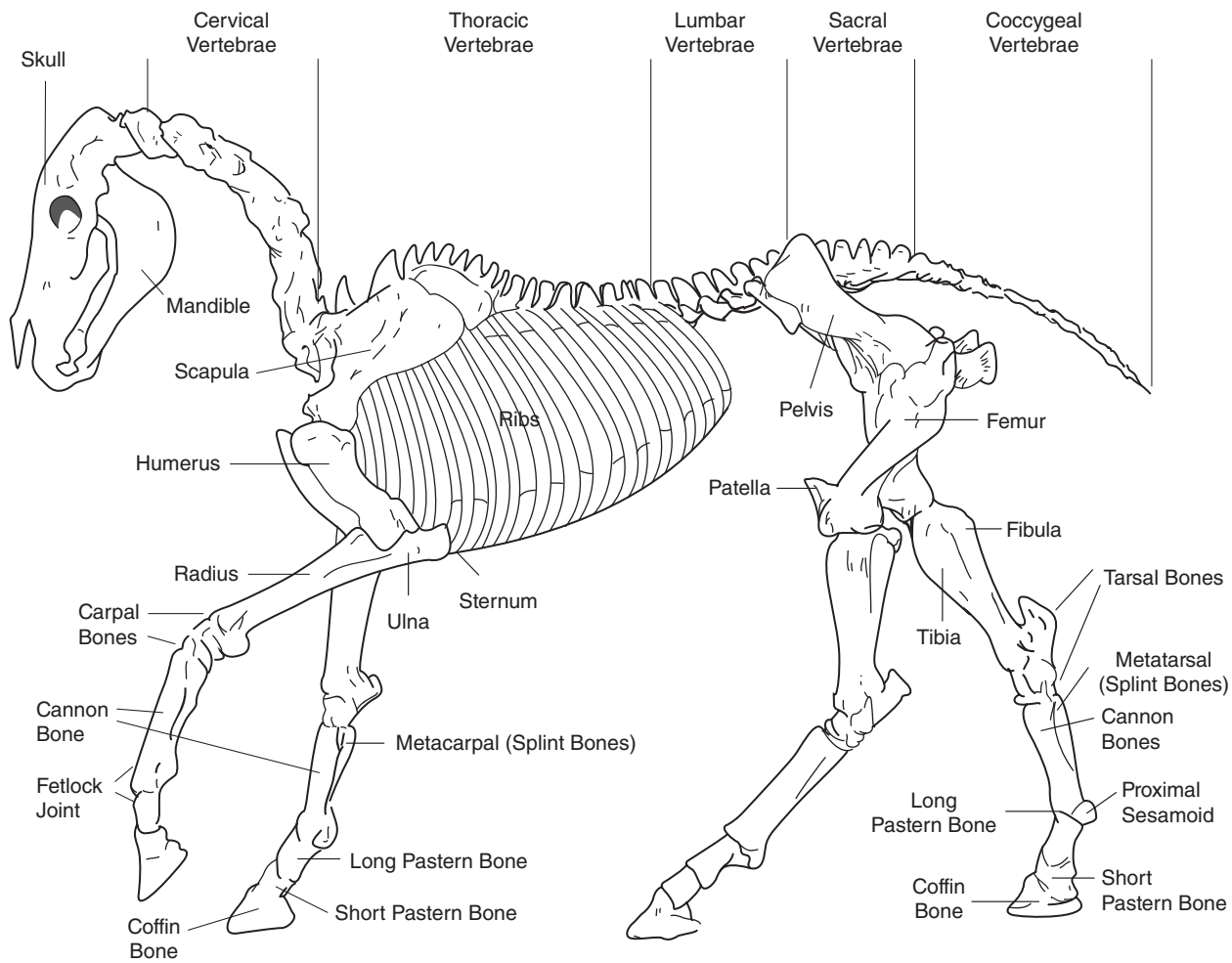


Figure 1.22 Equine skeleton.

