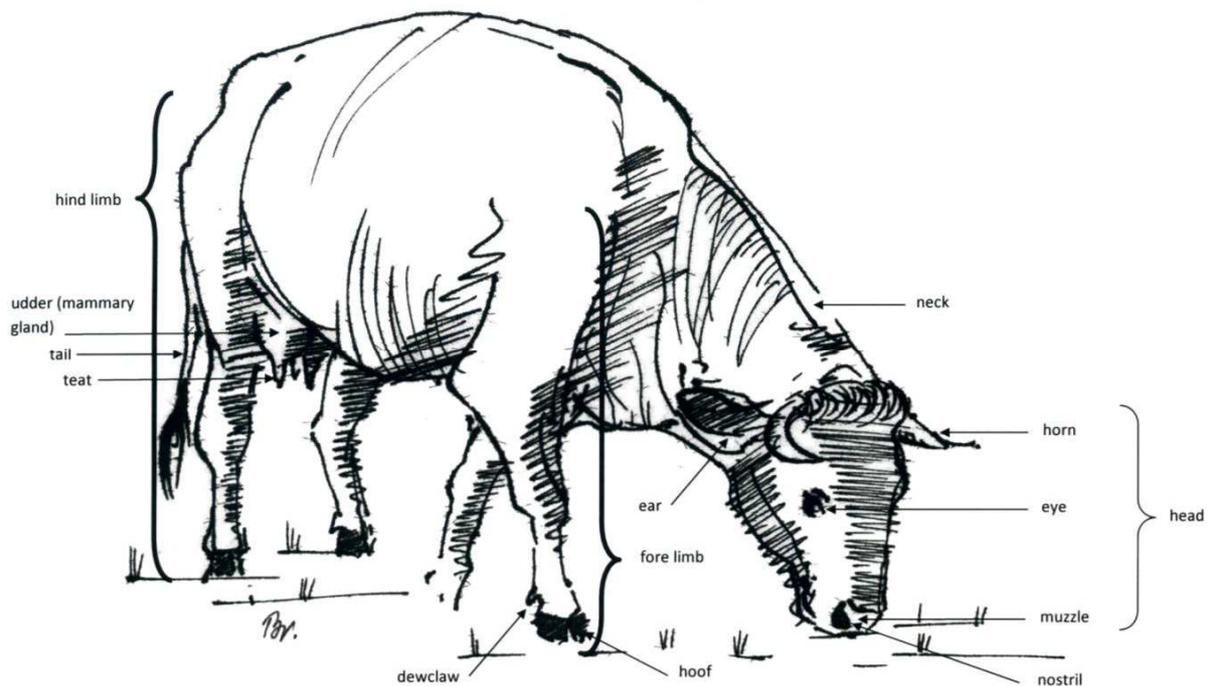


4. EXTERNAL ANATOMY OF ANIMALS (mammals; species specific body features)

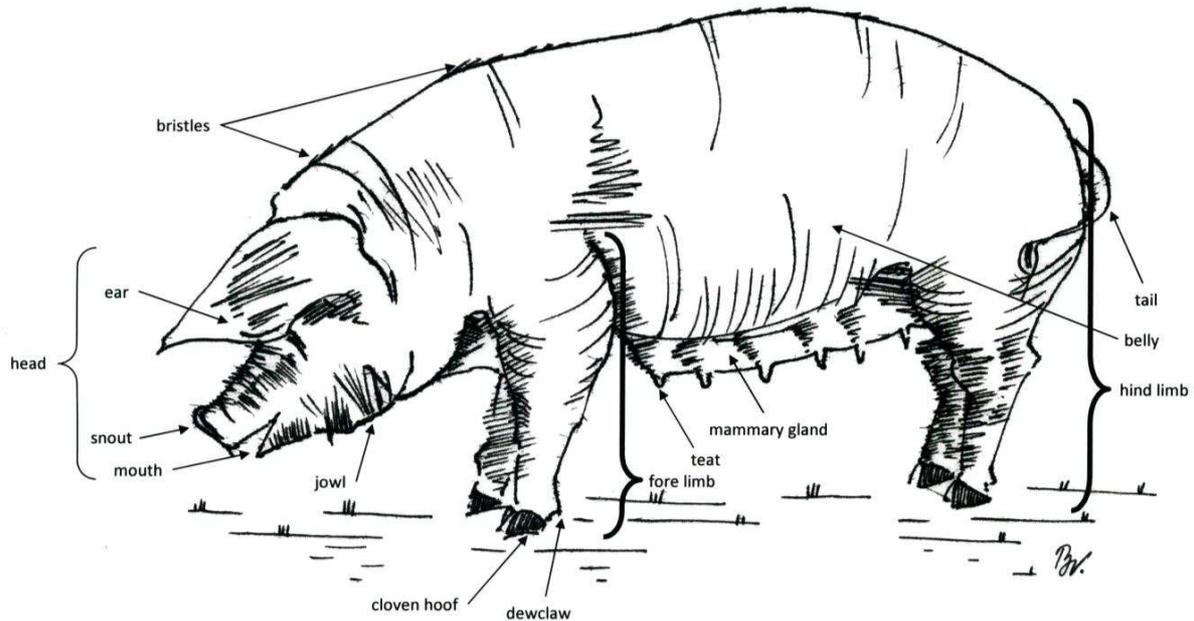
Anatomy is a branch of biology and medicine which studies the structure of living organisms. **Human anatomy** studies the structure of humans, **zootomy** deals with animal body structures, and **phytotomy** studies the structure of plants. There are many branches to anatomy, such as comparative anatomy, developmental anatomy or pathological anatomy, etc.

The basic unit of life is a **cell**. Groups of cells with similar functions form **tissue**. There are four basic types of animal tissues: connective, epithelial, muscle, and nervous. An **organ** is formed by a collection of tissues; while an **organ system** comprises two or more organs which cooperate with one another in order to perform a certain task. The **body** is a unique collection of interdependent organ systems.

As far as the **outer animal body structure** is concerned, there are several basic parts common to cattle and swine, as illustrated in the diagrams below. Sorted roughly from cranial to caudal direction the main parts of large animals are the **head, throat (neck), forelimbs, trunk** including **chest (thorax)** and **abdomen (stomach), tail** and the **hind limbs**. On the head we find **forehead, eyes, muzzle** in a cow and **snout** in a pig, **mouth with lips, ears**, and horns in a cow. Underneath the snout in pigs there is a jowl, sometimes referred to as pig's chin. The neck is located behind the ears and in front of the shoulder. The belly and ribs are found just behind the shoulders and elbow pocket.



Picture 1 - Outer body structure of cattle



Picture 2 – Outer body structure of swine

Skeletal System

The skeletal system is a structural framework that provides **support and protection** to the animal body. The skeletal system is also necessary for **motion of animals** as muscles are attached to the skeleton and joints are movable. The basic components of this system are bones, cartilages and ligaments. The main factors that influence bone development are stress of animals, level of hormones in the organism and also nutrition of animals represented by well-balanced diet and a certain amount of vitamin D in the foodstuff.

Muscular System

The main functions of muscular system are movement as well as producing heat. The system comprises **smooth, cardiac, and skeletal muscles**. Smooth muscles are directed by autonomic nervous system. They are part of blood vessels, digestive and reproductive system. Cardiac muscle forming the heart is also regulated by autonomic nervous system and cause involuntary movements (e.g. heartbeat). The last type of muscles is represented by skeletal muscles responsible for all voluntary movement as well as for particular involuntary movements as standing or breathing.

Some species have specific body parts and features. These include:

1) BODY COVERAGE

Fur is extensive body coverage typical of mammals. It is made of short, very fine and soft hair. The principal function of fur is thermoregulation. **Bristles** are thick, strong animal fibres collected at commercial abattoirs for use in brushes. Fish and snakes are covered with **scales** which protect the body and help in locomotion. Snakes periodically moult their scaly skins and acquire new ones. Specific types of body coverage include **wool hair** (textile fibre obtained from sheep and other animals e.g. goats, camel, rabbits etc.), **mane** - the hair that grows from the top of the neck of a horse or other equine and lions.

All birds are covered with **feathers**. The externally visible feathers which determine a bird's silhouette and the contour of wings, tail and body are called *contour feathers*. Body covering of amphibians, **skin**, often has protective colouring and is able to absorb water and oxygen from the

environments. **Exoskeletons** are hard external frameworks which support and protect the soft tissues of lower animals (e.g. shell of a crab or a crawfish). Some animal species are protected by **spines (quills)** which are modified hairs coated with thick plates of keratin (e.g. hedgehog).

2) BODY APPENDAGES

- **ANTENNAE** (sg. antenna) - paired appendages used for sensing in arthropods (e.g. paired, mobile, and segmented, located between the eyes on the forehead in insects)
- **TENTACLES** are usually two or more elongated flexible organs present in animals, especially invertebrates which are used for feeding, feeling and grasping (e.g. in a jellyfish) whereas there are **ARMS** in octopuses
- **WINGS** – appendages used for flight. Insects are the only invertebrates known to have evolved flight; they have two pairs of wings - forewings and hindwings. Wings in bats developed on finger bones and are much thinner than in birds; the result is quicker and more accurate flight. The tissue is able to regrow. For birds, flight is the main locomotion, their wings developed on forelimbs and appear in various shapes and sizes - enabling various speed and manoeuvring.
- **GILLS** are respiratory organs found in many aquatic organisms; they extract dissolved oxygen from water, and excrete carbon dioxide. Majority of bony fish species have five pairs of gills.
- **LIMBS** - most animals use limbs for locomotion /walking, running, climbing/, some animals can use their front limbs to carry and manipulate objects, some animals also use hind limbs for manipulation; fore limbs – anterior appendages /foreleg, wing, flipper/, hind limbs – posterior appendages /hind leg/
- **FINS** - most distinctive features of fish, composed of bony spines protruding from the body with skin covering them and joining them together; located in different places /dorsal fin, caudal fin, anal fin etc./ on the fish serve different purposes /moving forward, turning, and keeping an upright position/
- **TAILS** - the section at the rear end of an animal's body
- **HOOF/HOOVES** - the tip of a toe of ungulate mammals, covered with a thick keratin shell, grow continuously. Most even-toed ungulates /sheep, goats, deer, cattle, bison, pigs/ have two main hooves on each foot, together called a cloven hoof. Most also have two smaller hooves called dew-claws. Some odd-toed ungulates have one hoof on each foot; others /rhinoceroses, tapirs/ have three hoofed or heavily nailed toes, or one hoof and two dew-claws
- **HORN/S** - a pointed projection of the skin on the head consisting of a keratin covering. One pair of horns is usual, two pairs occur in a few wild species and domesticated breeds of sheep. Horns are usually curved or spiral and occur mainly in males. They grow soon after birth and continue to grow throughout the life.
- **ANTLERS** - usually large, branching bony appendages on the heads of most deer species. Antlers are found mostly on males, only caribou and reindeer have antlers on the females and grow faster than any other mammal bones. Antler growth and shedding is seasonal, and controlled by the length of daylight.
- **CLAW/S** are found at the end of a toe or finger in most mammals, birds, and some reptiles. They are made of keratin and used to catch and hold prey in carnivorous mammals /e.g. cats and dogs/, for digging, climbing trees etc. Many predatory mammals have protractile claws /can partially hide inside the animal's paw/, especially the Felidae.

- **BEAK** – (also bill or rostrum) is an external anatomical structure of birds used for eating, killing prey, manipulating objects, probing for food, feeding young, etc. Beaks vary significantly in size and shape from species to species. Two holes called nares (nostrils) connect to the hollow inner beak and the respiratory system.
- **PAWS** - soft foot of a mammal, generally a quadruped (dog, fox, cat, tiger, bear, rodent, etc.) that has claws or nails. A hard foot is called a hoof. Paws are used to pad feet for walking.
- **WHISKERS** – specialized hairs for tactile sensation that grow around the nostrils, above the lips, and on other parts of the face of most mammals, as well as on the forelegs and feet of some animals. A large part of the brain of many mammals is devoted to processing the nerve impulses from whiskers, because it is important for survival
- **SNOUT/MUZZLE** - protruding portion of an animal's face, consisting of its nose, mouth, and jaw
- **TRUNK** - a fusion of the nose and upper lip, elongated and specialized, elephant's most important and versatile “tool”

Sources:

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PODVEŠKÁ, K.: *Species Specific Body Features* (internal VFU materials)

1. Reading comprehension

Answer the questions

- Explain the difference between zootomy and phytotomy.
- What is a tissue in anatomy?
- Name two basic functions of skeletal system.
- What is the difference between smooth and skeletal muscles?
- Name and describe at least three body parts specific for cattle

2. Lexis

Read the definition and state appropriate body parts.

	Definition	Body part
1.	extensive body coverage of soft and short hair in mammals	
2.	protruding portion of animal's face with nose, mouth, jaw	
3.	respiratory organs in many aquatic organisms	
4.	the tip of a toe of ungulate mammals, with keratin shell	
5.	a pointed projection of the skin on the head, usually one pair	
6.	appendages used for flight	
7.	hair on the top of the neck of a horse, lions	

VOCABULARY

abbatoir	/ˈæbə,twaɪ(r)/	jatky
abdomen	/ˈæbdəmən/	břícho, dutina břišní
acquire	/əˈkwaɪə(r)/	získat, nabýt, osvojit si
anatomy	/əˈnætəmi/	anatomie
antler	/ˈæntlə(r)/	paroh
appendage	/əˈpendɪdʒ/	přívěsek, doplněk
bison	/ˈbaɪs(ə)n/	bizon
branch	/brɑːntʃ/	větev, odvětví
breed	/briːd/	pěstovat, chovat, plemeno
bristle	/ˈbrɪs(ə)l/	štetina, chlup
cardiac	/ˈkɑː(r)diæk/	srdeční
cartilage	/ˈkɑː(r)təlɪdʒ/	chrupavka
cattle	/ˈkæt(ə)l/	skot, dobytek
caudal	/ˈkɔːdəl/	kaudální, ocasní
certain	/ˈsɜː(r)t(ə)n/	jistý, určitý
chest	/tʃest/	hrud', hrudník
claw	/klɔː/	dráp, pařát
cloven hoof	/ˈkləʊv(ə)n huːf/	pazneht
comprise	/kəmˈpraɪz/	sestávat, skládat se z
connective	/kəˈnektɪv/	pojivový
cranial	/ˈkreɪniəl/	lebeční, kraniální
crawfish	/ˈkrɔːfɪʃ/	rak
deal with (sth)	/diːl wɪθ/	zabývat se (čím)
deer	/diə(r)/	vysoká zvěř, jelenovití
digestive	/daɪˈdʒestɪv/	trávicí, zažívací
elbow	/ˈelbəʊ/	loket
epithelial	/ˈepɪθiːliəl/	epitelový
equine	/ˈekwaɪn/	koňský
fibre	/ˈfaɪbə(r)/	vlákno, vláknina
fin	/fɪn/	ploutev
flipper	/ˈflɪpə(r)/	ploutev (velrybí, tulení)
forehead	/ˈfɒrɪd/ or /ˈfɔː(r),hed/	čelo
forelimb	/fɔː(r)lɪm/	přední končetina
framework	/ˈfreɪmwɜː(r)k/	soustava, kostra
gills	/gɪlz/	žábry
head	/hed/	hlava
hedgehog	/ˈhedʒ,hɒg/	ježek
hindlimb	/haɪndlɪm/	zadní končetina
horn	/hɔː(r)n/	roh, parůžek
involuntary	/ɪnˈvɒləntəri/	bezděčný, mimovolný
jowl	/dʒaʊl/	spodní čelist, sanice
ligament	/ˈlɪgəmənt/	vaz
mane	/meɪn/	hřívá

moult	/məʊlt/	svlékat, pelichat
muscular	/'mʌskjʊlə(r)/	svalový
muzzle	/'mʌz(ə)l/	čenich, čumák
nutrition	/nju:'trɪʃ(ə)n/	výživa
organ	/'ɔ:(r)gən/	orgán
outer	/'aʊtə(r)/	zevní, vnější
perform	/pə(r)'fɔ:(r)m/	vykonat, provést
predatory	/'predət(ə)ri/	dravý
rhinoceros	/'raɪ'nɒs(ə)rəs/	nosorožec
rib	/'rɪb/	žebro
skeletal system	/'skelɪt(ə)l 'sɪstəm/	kosterní soustava
smooth	/'smu:ð/	hladký
snout	/'snaʊt/	čumák, rypák
spiral	/'spaɪrəl/	točitý, šroubovitý
swine	/'swaɪn/	prase, vepř
tapir	/'teɪpə(r)/	tapír
tentacle	/'tentək(ə)l/	chapadlo
thermoregulation	/'θɜ:mə'regju'leɪʃ(ə)n/	termoregulace
thorax	/'θɔ:ræks/	hrud', hrudník
throat	/'θrəʊt/	hrdlo, krk
trunk	/'trʌŋk/	trup
vessel	/'ves(ə)l/	céva
whiskers	/'wɪskə(r)z/	vousy, fousky (kočičí)
zootomy	/'zəʊ'təmi/	zootomie, anatomie živočichů