

Post - mortem procedure

Protective clothing

- rubber boots
- rubber or plastic gloves
- rubber apron

Post – mortem examination plan

Description of the animal

Species, race, color, sex, age, weight, nutritional status, maintenance status

To define maintenance status carcass should be palpated in specific locations such as plica of the knee, forechest, sacral region, intercostal spaces. If the deposits are perceptible the maintenance status is good, if intercostal spaces are sunken, bones are visible and there is not a lot of fat tissue then maintenance status is average, bad or the carcass is strongly emaciated.

Dental condition can be helpful with determining age of the animal.

The description should include birthmarks and acquired distinguishing marks, for example - postoperative scars, lack of one finger etc.

History

We should ask owner about following things:

1. When did the animal die?
2. Since when it was ill?
3. Which clinical symptoms accompanied the disease?
4. Whether the animal has already suffered from similar symptoms?
5. Are there more ill or dead animals in the herd?
6. Breeding conditions
7. Whether the animal was treated and by whom? What kind of medicines were used?

Anyway, we should be aware of critical analysis of obtained information, because the owner can give us wrong information especially when there is a suspicion of neglect or cruelty for animals.

External examination

Signs of death, skin and hair, mucous membranes of natural body orifices

In order to minimise post-mortem changes, the examination should be carried out as soon as possible after death. Carcasses should be weighed. First, a thorough visual examination of the carcass should be made. All body orifices should be checked for discharges.

The condition of the skin and pelage should be noted and an examination made for ulcers, shot holes, tooth marks and external injuries. The carcass should be turned over and Any external parasites, noting abundance and location.

Particular attention should be paid to predilection sites, e.g. around the muzzle, eyes, ears and genitalia, on the neck, brisket, tail switch, axillae, groins and hoof clefts. The mouth should be examined and the condition of the oral mucosa, tongue and teeth
Recorded.

At the beginning examine signs of death. They have an important meaning in determine circumstances of the death and the time of death. It is important to examine lesions in particular order, to not remove one lesion while the second is examined.

1. Rigor mortis – start examine from head. Move head in sagittal plane and bend it to one side. Watch out for resistance of the individual muscles in the head and neck. Then examine rigor mortis in forelimbs – move them forward and backward and bend them in joints in accordance with their natural mobility. Act similar with hind legs.

Also for small and medium animals take forelimbs and hind legs, then try to move them closer to each other and shut them out, which allows examination of rigor mortis in trunk. At the end we examine rigor mortis in tail – move it in different directions. Rigor mortis begins 1 to 8 h after death, usually it is developed after 5 to 8 h. It lasts about 48-72h. The development of rigor mortis depends on musculature, work done before death and ambient temperature.

Heart muscle stops in diastole phase. When the rigor mortis increase, the blood from ventricles is squeezed into large blood vessels. Therefore, if blood is not squeezed from left ventricle you can talk about supravital heart damage, for example degenerative. Once mechanically removed rigor mortis never comes back. It is also important to remember that limbs of some animals (especially horses below the wrist) may not demonstrate rigor mortis because of lack of muscles. Also, at the other side some diseases especially ankylosis can be misdiagnosed as rigor mortis. Frozen and thawed corpse do not show rigor mortis.

2. Algor mortis – temperature of corpse equalize with ambient temperature. Examine it with applying the dorsal part of the hand to the surface of the body in different places, for example legs, trunk, limbs etc.
3. Palor mortis – it is visible on mucosa of oral cavity, conjunctives and unpigmented parts of the body.
4. Livor mortis - a settling of the blood in the lower (dependent) portion of the body, causing a purplish red discoloration of the skin. When the heart stops functioning and is no longer agitating the blood, heavy red blood cells sink through the serum by action of gravity. Livor mortis are most pronounced at white pigs with unpigmented skin. At other animals this sign is difficult to notice. Usually livor mortis are pronounced at lower abdomen in groin region. They are fading while we press them with the finger.

5. Drying of corpse – check it at muzzle, snout, eyeballs ears, tip of the tongue and tail. These organs become grey and wrinkled.
6. Formation of blood clots – they are mainly forming in right heart and big blood vessels. They are juicy, limp, flexible, they lie loosely in blood vessels and heart, they are easy to extract, usually red – colored or red-amber-yellow when agony lasts longer. In some diseases blood clots are not formed (poisoning by CO, hydrogen cyanide, suffocation, sepsis)
7. Autodigestion – fastest in organs with large amount of enzymes like pancreas, brain etc.
8. Putrefaction – the most characteristic for this process is an unpleasant smell (odor) of remains. During this process are formed lots of gases which accumulate in body cavities, intestines, forestomachs and cause bloat of corps. You must be very cautious when we opening these delays, because the gas with tissue fluid and digestive tract content can get on the face and to the eyes of prosector and cause infection. Put the knife below stern, stand on the left side of remains, just behind the front legs and turn back to the animal.

After examination of death signs, make detailed examination of hair and skin. First you must focus on pelage, if there are lacks of hair. Every place without hair must be described - describe place, size, region of the body and the shape of defect. Also you must describe surface of pelage –skin of healthy animals is covered by adhesive and smooth hair. At the end pull the hair to check out if it is well- or bad-implanted in skin.

After examination of hair describe lesions of skin. Examine continuity of skin, describe all defects, scratches, wounds, inflammation processes etc. with describing size, depth of lesion and region of the body. Check the flexibility of skin – if it's flexible then pulled fold of skin comes back to the previous position. If it's not – then we talk about lack of flexibility.

Examination of mucose membranes of natural body orifices

Start examination from mucosa vestibule of oral cavity, next is vestibule of nasal cavity, right and left eye conjunctive, right and left external auditory meatus, anus, vaginal vestibule/foreskin. It's very important to always make examinations in the same order.

Watch the region of mouth cavity, then with the fingers draw aside the lips and denude mucosa from the right and left side of the body. Describe moisture, colour and smoothness. Mucosa of vestibule of oral cavity should be moist, covered with a small amount of ductile mucus and saliva, pale pink, smooth with preserved continuity. It can be also pigmented on whole surface or partially. When there are lesions mucosa can be dry, covered with bloody, purulent exudation or fibrinous coating; then it becomes rough, ragged, some defects are created, and color of skin is different. Also look if there are any lacks in teeth or if there are additional teeth. Examine collocation of teeth, friction surface, color and cavities in teeth. Examine nasal cavity – we look if the symmetry of nostrils is preserved, the shape of nostrils. Then draw aside nasal wings and watch vestibule of nasal cavity and focus on the moisture, color and continuity. Healthy animals' vestibule of nasal cavity should be moist, covered with a small amount of colorless liquid, mucosa is pale pink or very strongly pigmented, with smooth surface. But usually it is covered with exudation in great amount with assorted color.

Start examination of eye from checking if palpebral rime is closed, half-closed or opened. – if there is any exudation there. Draw aside the eyelids and watch for conjunctiva – if it is moist, by what is it covered, what color does it have and if there any other visible pathological lesions. It should be moist, pale pink, covered with a small amount of colorless liquid. However, most frequently conjunctiva of eye has pink-red color, because the blood vessels are filled with blood. After describing conjunctives push eye cornea to determine tension in eyeball. The tension decreases with passing the time from death.

Start examination of ears from watching internal surface of auricle. Put the finger into the external auditory meatus and we check its patency. Usually in auditory meatus there is cerumen mixed with dirt or flaked epithelium.

Examination of anus consist in watching. If there are no pathological lesions, it is closed, dry, pink-colored. However most frequently anus and its regions are covered by feaces, mud, sometimes blood. Mucosa can be often swallowed, livid-red, and the anus is yawing.

When you examine external genital organs look for symmetry of labias, color and possible secretion. Draw aside labias and watch mucosa of vaginal vestibule.

Describe moisture, presence of mucus or exudation and color.

At males watch the penis, foreskin and urethral fossa. Watch mucosa, describe its moist, presence of smegma, color and ductility.

Internal examination

1. Blood, subcutaneous tissue, skeletal muscles
2. contents of the abdominal cavity, omentum, position of viscera, peritoneum
3. contents of thorax, sternum peritoneum, position of organs in thoracic cavity
4. oral cavity: teeth, gums, tongue, throat, tonsils
5. neck organs: esophagus, larynx, trachea, thyroid
6. pulmonary pleura, lungs, mediastinal lymph nodes
7. heart: pericardial sac, epicardium, left and right ventricles with valves, pulmonary artery, aorta, semilunar valves, heart muscle
8. spleen
9. liver, gallbladder,
10. diaphragm
11. pancreas
12. urinary tract and adrenal glands: kidneys, ureters, bladder, urethra
13. reproductive system: female and male
14. mammary gland
15. gastrointestinal tract: stomach,(forestomachs at ruminants), intestines, mesenteric lymph node

Additional examinations:

Histopathological, microbiological, parasitological, toxicological and others

Recognition

Predicate

Preparing carcass for the necropsy

The carcass should lie on section table in the dorsal-ventral position with head turned to the left side of prosector. When prosector is left-handed then carcass should lie on its right side.

Take the knife and make a cut along the sagittal line from mandibular symphysis to pubic symphysis. An incision should bypass the navel when the animal is young and bypass external genital organs of adult animals. Make two parallel cuts among penis of males. Take foreskin with penis in one hand and raise them up and use knife to cut it to the pubic symphysis, but leave it with carcass. If the animal is a female, the udder should then be cutted in the sagittal line.

After cutting the skin try to stiffen the body – put it in position which prevents its tilt from side to side. Start to prepare skin, especially in limb regions, and after dissected it back make some deep cuts of adductors of front limbs, which subsequently spread apart and lean on section table. Act similar with muscles of hind legs. Make cuts of the hip joint capsule, the leg should be laid flat on the section table.

After this describe: blood flowing out from subcutaneous tissue, axillary and groin blood vessels, appearance of connective tissue and skeletal muscles. Look for the flowing and describe abundance of it, fluidity, color and solidification in contact with air. If you examine carcass shortly after death, blood flow copiously, it's fluid, red and coagulates on air quite fast. In sepsis it could be dark-red, and it doesn't coagulates on air. When you examine "older" remains then the blood may flow out from vessels in small amount or move out from cutted vessels as a blood clot.

After describing blood examine subcutaneous connective tissue, especially its abundance and color. In this tissue you can find parasites especially in dorsal region of cows.

Watch press and cut skeletal muscles in different places, their development (well or not well), color, consistence (hard or limp) and fibrillar construction (preserved or obliterated).

At small and medium-sized animals make a transverse cut behind the xiphoid process, then put pointing and middle fingers into created whole in abdominal cavity and

between those fingers put a knife blade and cut abdominal walls along the white line to the pubic symphysis.

The chest is opened by extending the abdominal incision through the costal arches, possibly closest to the spine. Describe contents of abdominal cavity (liquid – in small amount enough to moist viscera, color of liquid; eventually additive contents like feces, urine, dead fetuses, bile, parasites)

Omentum (development – regular or not, continuity, adiposity, color – smooth, glistening, moist)

position of viscera (correct or not)

Parietal peritoneum (smoothness, moisture, translucency – translucent or non-translucent).

Opening the chest

First put omentum from stern on chest organs. Then cut with the knife the muscles from left and right side of stern. Next use small bone scissors or saw and cut the connection of bone ribs with cartilage ribs. Cut the stern, use left hand to catch xiphoid process and cut the part of diaphragm near stern and deeper – sterno-pericardial ligament. Watch the contents of chest. The presence of fluid in the chest cavity should be noted and the amount and color recorded. In pathological processes amount of liquid could be very big, moreover there could be blood, pus, parasites etc inside. Watch the sternum peritoneum – should be smooth, moist and glistening, and the sternum muscles should be visible through this. Describe position of organs (correct or not) Describe parietal peritoneum (smooth, glistening, translucent)

To prepare organs of neck the skin and muscles should be cut at the angles of the mouth and the lower jaw disarticulated. Cut the muscles of the base of mouth and remove tongue. Then catch the tongue with one hand and rise it up and use the second hand to cut with the semispherical motion palate and tonsils. Cut hyoid bones in joint connection of bigger hyoid bone with the smaller one. Pull up the cutted organs and make a string motions with the knife and cut all the neck organs to the inlet of the chest. Make two deep cuts among the arch of first ribs, on internal side, to separate all tissues connecting ribs with neck organs. Leave the knife and catch the trachea and esophagus and pull all organs at an angle of 45 degrees backward. Pull out all organs.

Start examine of tongue with describing its development (normally/not), examine mucosa of tongue (seromucosis with preserved continuity, pale pink, covered with small amount of tensile mucus, softened), describe dorsal side of tongue (well developed lingual papillas), consistence (hard), color of muscles and preservation of filamentus structure.

Use the intestine scissors to cut soft palate in sagittal line, this way the tonsils are showed. Watch the tonsils, press it and cut. Describe shape, size, color, and succulence. Describe mucosa of throat. Use the same scissors to cut esophagus among all its length, then describe its mucosa, contents, softness, lesions etc.

Respiratory tract

Use intestinal scissors to cut larynx, trachea and main bronchi. Describe symmetry of laryngeal cartilages, development of tracheal rings and contents and appearance of mucosa of larynx and trachea.

Pulmonary lobes should cover the heart, the lungs should lie with dorsal side up and tongue should be far from prosector.

The lungs should be examined, noting its development color and consistency. The lung substance should be palpated between the finger and thumb and the presence of any firm areas recorded. Cut the lungs with parenchymatic knife in 1/3 of back part of lungs. Describe all cross-sectional area (color, blood which flows out from cutted vessels, presence of parasites etc.) Next examine the aeriality – take from the

surface of cross - sectional area small piece of lung and put it into the water. Non-aerial pieces are drowning. Use Cooper scissors.

Heart

Watch pericardial sac. Describe its development, adiposity, then take the top of the pericardial sac and cut carefully with the scissors small hole. Describe the liquid in sac, its amount, color and then cut the hole sac from the top to base of heart. Describe endocardium and epicardium. It should be smooth, glistening and translucent. Use knife to cut the heart. Make first cut by the left ventricle. Set the knife vertically to the surface of ventricle. Left auricle of heart should be on the left side of knife. This made cutting extend with scissors in left atrium direction. After opening the ventricle and atrium describe their contents, Remove the blood clots and describe endocardium, mitral valve (well developed, membranous, smooth, translucent), describe chordae tendinae. Cut the right ventricle in similar way. Describe contents of right ventricle, and right atrium. Watch and describe tricuspid valve and chordae tendinae.

Examine pulmonary artery. Use the scissors to cut right ventricle parallel to the descending branch of left coronary artery of heart at a distance of about 2 cm and cut the arterial wall as far as it's possible. Watch and describe internal membrane of artery and arterial valve.

Open the aorta – put the blunt end of scissors under the leaflet of mitral valve, scissors are directed straight into aorta, second arm of scissors put on the external wall of heart like that between this and made previously cutting has formed the triangle in which base there is left auricle. Cut the wall of heart muscle and aorta. Describe contents, internal membrane and semilunar valves of aorta. At the end examine heart muscle. Cut it with the knife which is perpendicular to the cross-sectional area of the left ventricle. Make a deep cut of muscle of left ventricle, describe its color, examine consistence.

Organs of abdominal cavity are removed in the following order:

1. Digestive tract with spleen and pancreas
2. Liver with diaphragm
3. Urogenital tract

Start taking out the digestive tract from moving small and large intestine beyond the abdominal cavity, then use left hand to take rectum, and pick it up – then the course of mesentery will be visible. Cut it gradually until you reach the stomach, cut the gastrointestinal connection, cut esophagus close to the esophageal hiatus of diaphragm and put all the digestive tract on the table. Next separate the spleen using scissors and leave it for further examination. Cut also pancreas and liver and put it near spleen. Take out liver with diaphragm, in this purpose make a cutting of diaphragm along the rib arch from left and right side. Take out the liver and leave it near spleen.

Take out whole urogenital tract, undercut implantations of kidneys with adrenal glands and prepare ureters. Undercut implantations of uterus and ovaries. Pull the bladder forward and cut it at the height of urethra.

Order of examination:

1. Spleen
2. Liver
3. Pancreas
4. Adrenals and Kidneys
5. Ureters, bladder
6. Female or male reproductive system
7. Digestive tract

Spleen

Watch the spleen, describe its size, shape, edges, Cut it along with the parenchymatic knife. Describe appearance of cross-sectional area (color, blood), move the top of the knife across the surface of spleen and notice how much parenchyma is on the top of knife. Describe consistence of spleen.

Liver

First watch the diaphragmatic surface then – gastric surface. Pay attention to the development of each hepatic lobes, their number and depth of the indentations separating them from each other. Press it to describe its consistence. Use parenchymatic knife to make cross –section, cut it crosswise and deeply, describe the surface of cross-section, visible of hepatic lobules, color, amount and other features of blood which flows out from cross-section. Then examine gallbladder. Describe its size and bile fulfillment. Push and notice if the bile flows out from biliary tract which confirms its patency. Cut the tract with small scissors and wall of gallbladder, describe appearance of its serosis membrane (should be smooth, glistening translucent). Describe diaphragm muscle.

Urogenital tract

Describe fat bedding of kidney, then make a deep cut with parenchymatic knife along the curvature to the renal pelvis. After cut, fold both cutted parts together to find out if there is a “lip”. Describe proportion of cortical part to the core of kidney. Describe color of kidney. The kidneys should be examined and the capsules stripped, Describe if the capsule is easy or hard to stripe. Note any abscesses which may be of pinhead-size in the kidney cortex; the consistency of the kidney substance should also be recorded (firm or soft and pulpy). The presence of cysts, stones and infarcts should be noted. Describe also appearance of renal pelvis, its development, color, size.

The ureters and bladder should be opened and the condition of the linings noted. Describe amount of urine in bladder, cut it and describe mucosa.

The female genital tract should be opened from the vulva to the tips of the uterine cornua. The presence or absence of fetuses should be recorded as well as scars of previous implantations (in rodents and

carnivores). The uterus may be inflamed and contain septic material. The ovaries should be incised and note taken of the presence of cysts, or corpora lutea. Specimens should be collected. The male reproductive tract should be examined and by palpation and the testes incised. Again, specimens should be collected.

Digestive tract

The mesentery should be separated from intestines to stretch out the digestive tract. then put the blunt end of scissors into the cardia and cut mesentery along major curvature. Describe contents of stomach and appearance of mucosa. Usually it's wrinkled and it's similar to the surface of brain. If it is impossible to straighten out folds, they are results of inflammation. Describe mucosa. Cut intestines, watch and describe mucosa.

Ruminants:

The omasum and the reticulum should be opened. The reticulum should be examined for foreign bodies. The abomasum should be opened along the greater curvature

using the enterotome. The condition of the abomasal epithelium should be noted.

Two ties should be made close together between the abomasal pylorus and duodenum with a cut between the ties. Similarly, the small intestine and the caecum should be tied at the ileo-caecal valve. The small intestines should be opened, washed and scraped into half a bucket of water. The intestinal lining should be examined for lesions. The same procedure should be conducted for the caecum and the large intestine

Horses

The carcass should be positioned on its left side. The left foreleg is severed by cutting all the

muscular attachments that hold the leg to the chest wall. The leg is then laid over to lie flat on the ground. The left hindleg is similarly disarticulated by cutting down to the coxo-femoral joint. An incision is now made through the skin from the anus to the chin and the body is skinned back almost to the vertebral column. The entire upper wall of the body cavity is removed by incising along the midline from the xiphoid cartilage to the pubis. From the pubis, the incision is continued almost to the tuber coxa then forward to the origin of the last rib. The ribs are now all severed near their articulations with the vertebrae using an axe or a saw. Next, the ribs are severed along their sternal ends from the thoracic inlet to the last rib. The incision is carried back until it joins the original incision at the xiphoid cartilage.

Beginning at the rear, the severed body wall should be lifted clear of the carcass, and the

underlying attachments cut, including the diaphragm. A saw should be used to cut through the pelvis, thereby exposing the pelvic organs. The viscera are now exposed and can be examined. In the horse tribe, particular attention should be paid to an examination of the blood supply to the great colon and caecum. This is accomplished by opening the abdominal aorta longitudinally and tracing and opening the anterior mesenteric artery and its branches.