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Special Issue: Manual guidance of veterinary clinical practice and laboratory

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Research Article

Postmortem examination in veterinary practice

Necropsy is the examination of animals after death and it helps in diagnosis of diseases. Necropsy includes systemic examination of dead animals, recording pathological lesions and interpretation approach to diagnosis of disease. The knowledge of histopathology, microbiology, immunology and toxicology is required for confirmation. The necropsy examination is an integral part of disease investigation; therefore veterinarian should have to know the techniques of postmortem examination, recording of lesions and collection of proper material for laboratory.

The reference for all postmortem examination [1-8]:

Equipment needed for postmortem

The equipment and disinfectant reagent which required during postmortem operation are listed below:

- Gloves
- Boots
- Coveralls
- Protective glasses
- Boning knife
- Steel - for sharpening
- Scissors
- Forceps
- Pruning shears - AKA rib cutters
- Wire cutters
- Plastic wide mouth containers
- 10% buffered formalin (from a veterinarian)
- Sealable bag (Zip-lock bags)
- Permanent marker
- Needles
- Syringes

Disinfectant reagents

Phenolics: General disinfectant. These are active against most bacteria except for spore forming bacteria, such as Anthrax and Clostridium. Some viruses may be sensitive to these compounds.

Alkalis: Examples: Lye, Lime, and Sodium Carbonate. These act against most bacteria as well as spore forming bacteria (i.e. Anthrax, Clostridium) as well as some viruses.

Hypochlorites: Examples: Sodium hypochlorite and Chlorinated lime. These chemicals have a wide antibacterial spectrum, but have little activity against spore forming bacteria and Mycobacterium (eg. the causitive agent of Johne's disease). They are active against viruses and protozoa as well. The activity of the chemical is greatly reduced by organic material and high pH (Alkali environments).

Chloramine: Active against most bacteria including spore forming bacteria and Mycobacterium.

Quaternary Ammonium: Active against most bacteria, except Mycobacterium. Will also act against some viruses. Activity is greatly reduced by the presence of organic matter.

Chlorhexidine: Active against most bacteria and fungi, but not against spore forming bacteria or viruses. Activity greatly reduced by the presence of organic matter.

Hydrogen peroxide: Active against bacteria, spore forming bacteria and viruses.

Virkon: Active against many viruses, bacteria including some spore forming bacteria such as Clostridium, and fungi.

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Postmortem examination in large animals

- ✓ Place animal on left side (Ruminants)
- ✓ Place horse on right side and dog on vertebral column Make mid ventral incision with knife from chin to anus. Surround the prepuce, scrotum/mammary gland.
- ✓ Remove skin dorso ventrally. Remove skin at face, neck, thorax and abdomen.
- ✓ Cut the muscles and fascia in between scapula and body; remove fore legs. Raise hind legs, cut the coxofemoral ligament.
- ✓ Examine subcutaneous tissue, muscles, superficial lymph nodes prescapular, prefemoral supramammary, etc.
- ✓ Open abdominal cavity by cutting muscles and peritoneum. Open thoracic cavity by cutting xiphoid cartilage at sternum; lift ribs and press them to break at joints with vertebral column.
- ✓ Examine the visceral organs in both cavities: Thorax: Heart, Lungs, Trachea, Oesophagus,
- ✓ Mediastinal lymphnodes, Diaphragm
- ✓ Abdominal cavity:
- ✓ Ruminants: Rumen, Reticulum, Omasum, Abomasum and other animals like Monogastric animals animals: Stomach Liver, Pancreas, Intestines, Mesenteric lymphnodes, Spleen, Kidneys, Ureter Pelvic cavity: Urinary bladder, uterus

Postmortem examination of poultry

- ✓ Dip the dead bird in antiseptic solution or in water to avoid feather contamination.
- ✓ Keep the bird on post-mortem table at vertebral column and look for any lesion or parasite on skin.
- ✓ Examine the eyes, face and vent.
- ✓ Remove skin through a cut with knife and with the help of fingers. Expose thymus, trachea, and esophagus in neck.
- ✓ Break the coxofemoral joint by lifting the legs. Examine the chest and thigh muscles.
- ✓ Cut on lateral side of chest muscles. Lift the chest muscle dorsally and break bones at joints with thorax. Cut bones at both sides and remove muscles, boncs tc expose thorax, abdomen.
- ✓ Examine different organs.
- ✓ Cut proventriculus and pull the organs of digestive tract out. Separate liver, spleen, intestines, caecum, proventriculus, gizzard, etc.
- ✓ Expose bursa just beneath the cloaca
- ✓ Cut beak at joint, examine mouth cavity and expose esophagus and trachea.
- ✓ Remove skull of head and make a square cut on skull to expose brain.
- ✓ Take a forceps and place in between thigh muscles, remove fascia and expose the sciatic nerve. Separate each organ; examine them for the presence of lesion.

The most common postmortem observed from poultry are listed as:

Stripes in leg- or breast-muscle: Sarcosporidiosis diagnosed by cytology of such a stripe reveals the bradyzoites.

A large dark spot distal to the keel: Swollen liver

Changes of the skin: Cnemidocoptes, yeast-infection

Opaque air sacs or (fibrinous) inflammation: Chlamydiosis

Opaque air sacs or obvious inflammation: Bacterial infection: rods or

Cocci in cytology smear; culture and sensitivity test.

Airsacs covered with white/yellow plaques: Fungal infection; diagnosis: wet mount (heated with chlorallactophenol), showing hyphae, culture.

Air sacs solid with white/yellow material: chronic fungal infection, mostly aspergillosis; diagnosis: wet mount showing hypha, culture.

Air sacs, esp. cervical and prescapular, with small black dots in passerines and small psittacines: Sternostoma tracheocolum infestation; diagnosis: magnifying-glass and wet mount.

Air sacs filled with food: forced feeding; diagnosis: wet mount and histology.

Pericardial sac filled with fluid: inanition, cachexia; diagnosis: muscle wasting, oedema and gelatinous fat-tissue.

Pericardium covered with white chalky deposits: visceral gout; diagnosis: wet mount with crystals; often in combination with nephritis

Crop:

- ✓ Thickened wall with white material: yeast infection; diagnosis: smear of the material; culture.
- ✓ Thickened wall with mucous material: capillaria infection; diagnosis: smear of scraping of the epithelium; histology.
- ✓ Thickened wall with grey/yellow material, sometimes with trapped air bubbles; trichomoniasis; diagnosis: wet mount; cytology; histology.

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- ✓ Local yellow necrotic ulceration: pox-lesions; diagnosis: Macroscopic (gross) examination; histology; virus culture.
- ✓ Local red mucosal thickening: papilloma: diagnosis: histology.

Stomach (proventriculus and ventriculus):

- ✓ Dilated proventriculus and gizzard, often stuffed with seeds (sunflower): gastric dilatation syndrome; diagnosis: histology; (ganglio) neuritis, lymfoid infiltrates in the adrenals.
- ✓ An empty proventriculus with excess of mucous: Macrorhabdes ornithogaster (formally "megabacteria"); diagnosis: wet mount and cytology.
- ✓ Swollen red glands in proventriculus: Tetrameres spp; diagnosis: parasitologic examination. Intestines

Haemorrhagic contents duodenum: Coccidiosis; diagnosis: wet mount, cytology.

Haemorrhagic, black contents in the entire small intestine: Haemorrhagic diathesis; diagnosis: history (fasting during high energy need for over 24 hours), macroscopic (gross) examination.

Pseudomembranous covering of the duodenal wall: Hexamitiasis; in cranes; diagnosis: wet mounts, cytology and histology.

Thickened wall with or without blood in the lumen: Enteritis; diagnosis: wet mount and cytology; parasitology; microbiology. Beware: in psittacines very rarely coccidia, often ascaridia; in small passerines rarely worms, often coccidian spp.

Haemorrhagic contents: lead intoxication, clostridium infection, pseudomonas infection, Giardia spp.; diagnosis: lead in gizzard; lead analysis liver and kidneys; cytology, culture.

Clear watery contents in small intestine with flabby wall: Hexamitiasis; diagnosis: fresh wet mount, cytology, histology.

Yellow non-digested starch and broken seeds in small passerines: Cochlosoma or Campylobacter spp.: diagnosis: fresh wet mount, cytology, and selective culture.

Enlarged caeca with pseudomembranous to necropurulent content: Typhlitis; diagnosis: galliformes: histomoniasis ("blackhead"); diagnosis: cytology, Histology (often with liver lesions).

Tongue with yellow "abscesses" at the location of the salivary glands in psittacines: Metaplasia, due to vitamin A deficiency; diagnosis: wet mount, diet history, histology.

Chronic, necrotic lesions especially in commisures: Tuberculosis: diagnosis: cytology (acid fast stain), histology, culture.

The presence of turbid mucus: Sinusitis; diagnosis: wet mount, cytology, culture.

Steps of postmortem examination

Before starting postmortem examination collection of information from owner is the first option. The anamnesis should be taken careful with date and time of death of animals. The post-mortem record includes the aspects of animal identification, illness, therapeutic and preventive measures adopted and date and time of death.

External examination

Animal should be examined externally before opening the body for the presence of lesions on body surface. Eyes, ear, anus, vulva, mouth; nares etc. should be specially examined for the presence of blood and any other lesion. The unclotted blood is coming out from natural orifices, it should be examined for the presence of anthrax bacilli and such carcasses must not be opened for post-mortem examination. Following points should be taken into consideration while conducting external examination.

- ✓ Trauma example: wound, fracture, cuts, etc.
- ✓ Fungal infection example: Ringworm.
- ✓ Parasitic infestations example: Mange, lice, ticks Side of animal is lying down on earth.
- ✓ Discharges from openings.
- ✓ Burn, ulcers, erosions etc.

Subcutaneous tissue and musculature

Examine the subcutaneous tissue and musculature after removal of skin for the presence of lesions such as: Congestion, haemorrhage, oedema, nodule, anemia, icterus, Fat deposits. Necrosis on muscle hardening, calcification. In ruminant animals tongue shall be palpated to detect: abscesses, actinobacillosis, an incision shall be made through the center of the each internal pterygoid and external masseter muscles (Cysticercus bovis).

The medial retropharyngeal, lateral retropharyngeal, parotid and mandibular lymph nodes are to be exposed, examined visually and carefully incised. Two to three incisions/slices right through the nodes is considered sufficient. In equine the inspection of the head must also include the guttural pouch. Careful examination must be made of the abdominal walls for encysted parasites, of the neck region for fistulous conditions near the first two cervical vertebrae, and of the axillary and subscapular spaces of white and gray horses for melanosis.

Abdominal and thoracic cavity

Just after opening the carcass, one should observe the presence of any lesion in abdominal and thoracic cavity and following points must be kept in mind. Accumulation of fluid (serus, serosanguinous, blood, pus, fibrinous or fibrous adhesions, Parasites, Abscess and tumour.

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Respiratory system

Organs tissue to be examined: External nares, nasal passage, larynx, trachea, bronch, lungs, air sacs (poultry) mediastinal lymphnodes, pleura. Lungs- Congestion, consolidation, nodules, presence of exudate on cut surfaces, oedema, atelectasis, emphysema, haemorrhage, and necrosis. Mediastinal lymph nodes- Oedema, hardening, calcification, congestion, haemorrhage *Lesions to be observed:* Discharge from external nares. Growth (granuloma/polyp) innasal passage if there is blood-mixed nasal discharge. Trachea and BronchCongestion, haemorrhage, presence of caseous exudate, frothyexudate (Figure 1,2).

Cardiovascular system

Organ tissue to be examined: Heart, aorta, arteries, veins and lymphatics. Lesions to be observed: Fluid, blood, pus etc. in pericardial sac. Adhesions, fibrin, fibrosis, Congestion, haemorrhage, necrotic foci, Hardening of blood vessel, obstruction, thrombi, Presence of parasites, Post-mortem clot / thrombi. The techniques how to incise and examine of the heart is detailed in figure 3,4.

Digestive system

Organ tissue to be examined: Mouth cavity, esophagus, crop, proventriculus, gizzard (poultry), rumen reticulum, omasum, abomasum (ruminants), stomach, intestine (duodenum, jejunum, ileum, caecum, colon, rectum), cloaca, vent (poultry), anus, liver, pancreas, gall bladder, mesenteric lymph nodes etc.

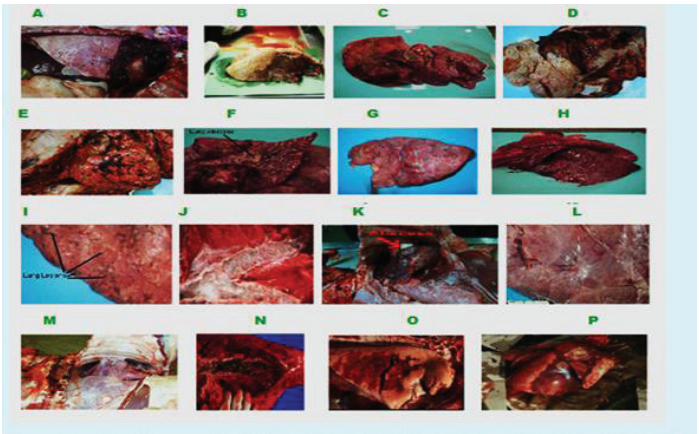

Figure 14.1: Abnormal of lung. **A:** bronchopneumonia. Notice how the bottom-front of the lung is darker than the rest of the lung. Usually this part of the lung will be heavier than the more normal, pink lung to the left. **B:** Bronchopneumonia. **C:** chronic pneumonia. Notice how the lung looks darker (or redder) than normal pink lung tissue. This lung may be heavier than normal lung and will not have the "spongy" feel to it. **D and E:** the diseased, darker, redder lung to the right compared to the more normal lung tissue to the left. The diseased lung is heavy compared to the light, spongy normal lung tissue. **F:** An abscess will have a liquid to "cottage cheese" like appearance in the middle. A tumor or other growth will usually be harder in the middle. **G:** pulmonary (lung) emphysema. When pinched, this lung will "pop" like bubble-wrap. Air has accumulated in areas where there is normally only tissue. **H:** Pulmonary consolidation. This lung will be heavy and "wet". It is also much darker than normal lung tissue. The lung may contain blood or other types of cells due to inflammation, or other disease process. **I:** Presence of lung worm. **L:** The lung is adhered to the rib cage. These types of adhesions are commonly found in cattle. **N and P:** Pneumonia. The red areas are the most affected and there may be some collapse of the lung in these areas.

Figure 1:

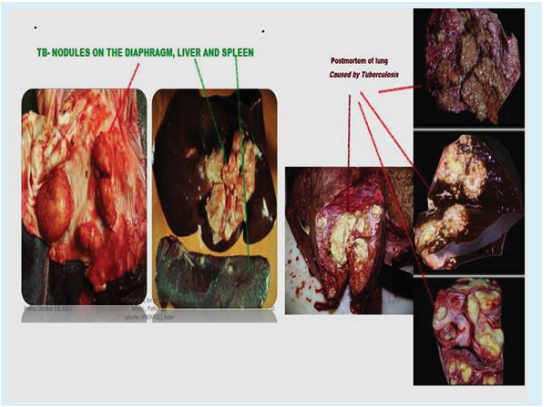

Figure 2: Tuberculosis lesion on lungs and other organs under postmortem inspection.

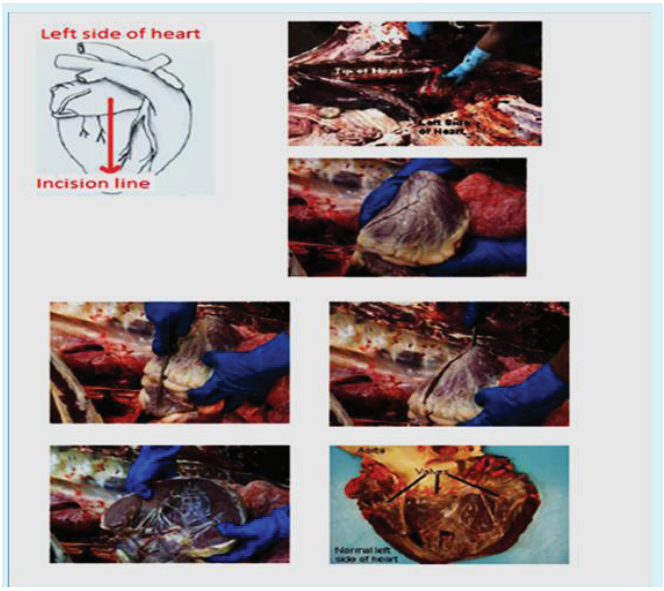

Figure 3: Procedure heart incison and diagnosis.

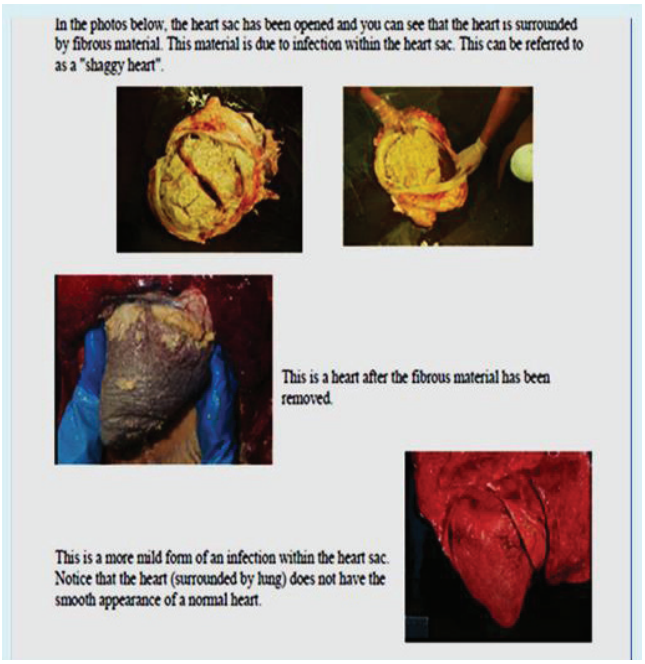

Figure 4: Abnormality of heart.

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Lesions to be observed: Erosions, ulcers, vesicles, Congestion, haemorrhage, oedema. Necrosis, Icterus, Absess/pusPerforation, needles or hard objects in reticulum. Intussusception, torsion, volvulus. Parasites, Atrophy, hardening, nodules. Contents, catarrhal, blood mixed, digested/undigested feed material, thickening of wall of intestines. Cut surface of liver for parasites, lesions in bile duct (Figure 5,6).

Urinary system

Organ tissue to be exatnined: Kidneys, ureter, urinary bladder, urethra.

Lesions to be observed: Congestion, haemorrhage, infarction, oedema. Necrosis, hardening, nodules and deposition of salts, calculi, Obstruction (Figure 7).

Genital system

Organ tissue (female): Ovaries, oviduct, uterus, cervix, vagina.

Male: Testicles, Epididymis, penis, prepuce.

Lesions to be observed: Cysts in ovary. Congestion, haemorrhage, oedema. Foetus in uterus, pus, fluid. Necrosis, overgrowth, nodules. Atrophy, adhesions, granularity. The step how to open udder and examine (Figure 8,9).

Immune system

Organ tissue to be examined: Spleen, lymph nodes, bursa and thymus (poultry), bone marrow, Peyer's patches, GALT and RALT. The retropharyngeal lymph nodes shall be incised except for partially dressed carcasses, where it may be easier to incise the parotid lymph nodes. The mesenteric lymph nodes,

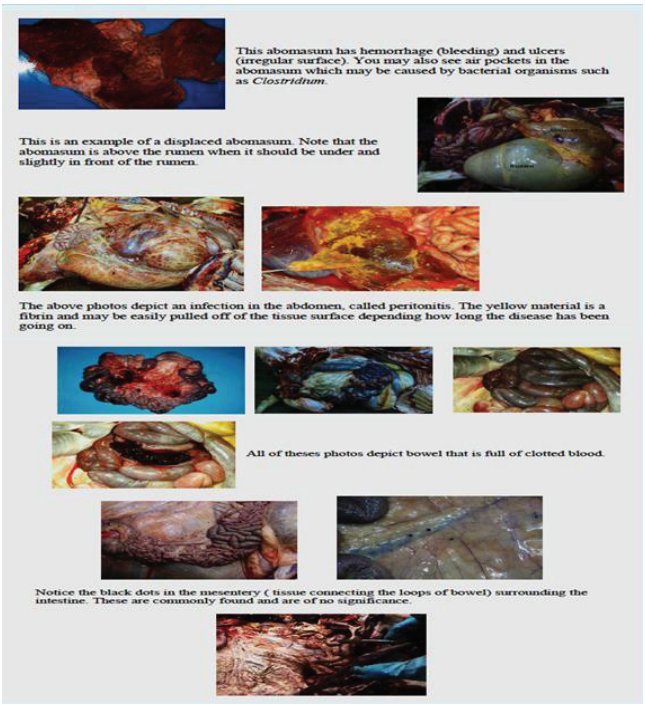

Figure 5: Abnormality of stomach and intestine.

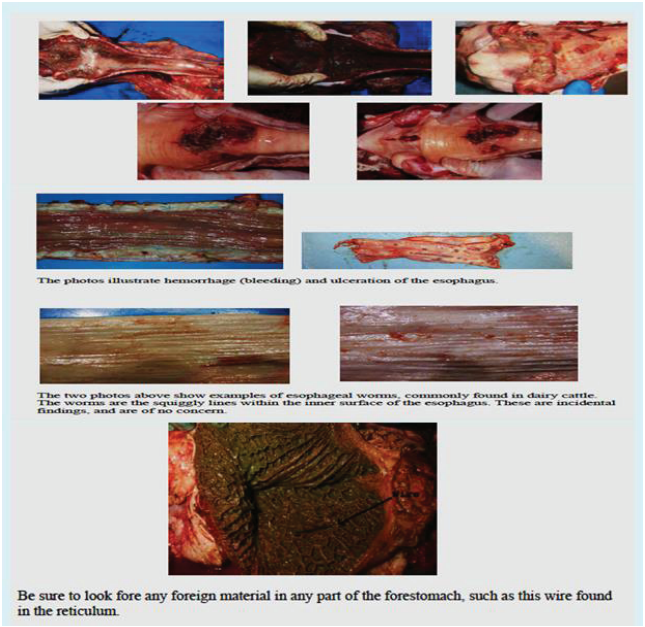

Figure 6: Abnormality of esophagus and reticulum of animals.

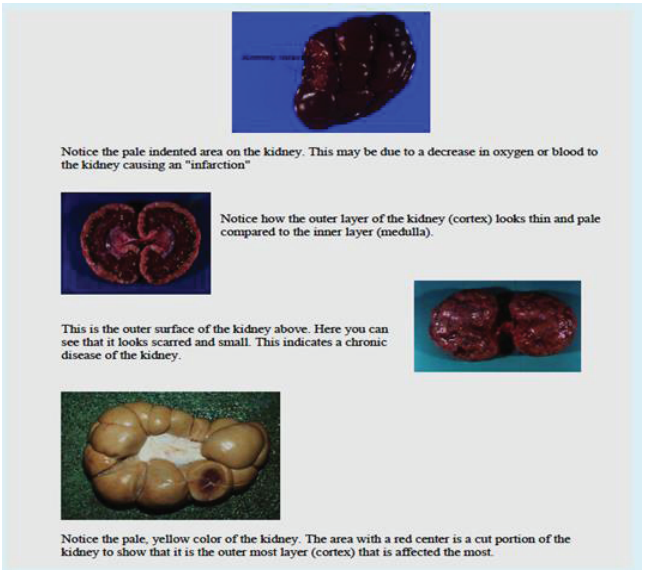

Figure 7: Abnotmality of kidney of domestic animals.

the bronchial, mediastinal, hepatic, and superficial body lymph nodes (subiliac, superficial inguinal or mammary, superficial cervical) are to be routinely visualized and palpated. Lymph nodes shall be incised whenever palpation is inadequate to determine the absence of abscesses indicating caseous lymphadenitis or if granulomas are suspected and granulomas consistent with a Tuberculosis lesion shall be observed. Lesions to be observed: Size, shape, atrophy, hardening, Oedema, congestion and haemorrhage.

Nervous system

Organ tissue to be examined: Brain, Spinal cord, nerves, meninges.

Lesion to be observed: Congestion, haemorrhage, hema-

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Figure 8: The step how to open udder of cattle.

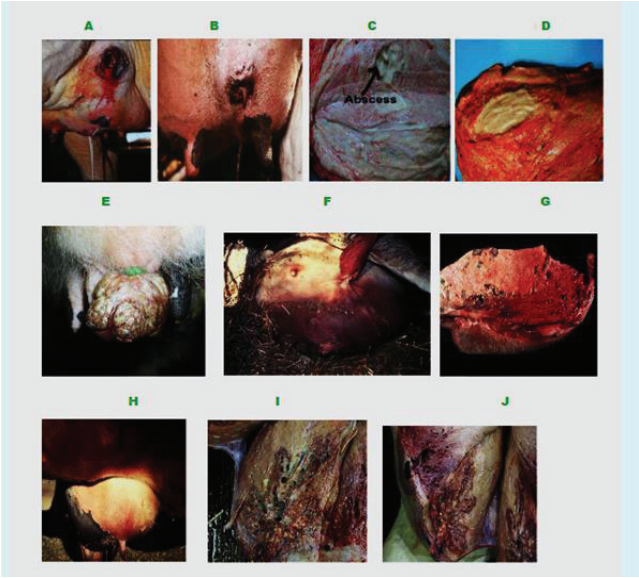

Figure 9: Abnormality of udder A and B: Draining of abscess fron uder. C and D: Mammary gland abscesses. These will usually be confined to one quaeter. E: Tumor in udder. F,G,H,I and F, J: Progressive Mastitis.

toma. Oedema, swelling, Abscess. Hypoplasia.

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