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Lymphatic system

Examination of the lymphatic system is important for many reasons. On the one hand, lymph nodes and lymph vessels can become affected, and show characteristic lesions, in various infectious diseases, such as actinobacillosis, tuberculosis, purulent infections and mycotic lymphadenitis, and particularly bovine leukosis. On the other hand, the lymphatic system participates in pathological processes within the drainage area of a particular part by means of reactive (or metastatic) swelling, tenderness or hardening; such changes provide information about affected organs which may be concealed and inaccessible for clinical examination. Finally, abnormal enlargement of a lymph node may affect the function of adjoining organs by pressure or by infiltration.

In this connexion, when taking the case history the veterinary surgeon may put questions concerning -the prior occurrence of losses through disease of the "glands" (i.e. bovine leukosis), and the results of any official blood tests; also whether recently purchased cattle came from herds, officially free from leukosis or not. The general examination (p. 6S) may have already detected abnormal enlargement of one or more lymph nodes.

Clinical examination of the lymphatic system takes the form of inspection and palpation of accessible lymph nodes, and if necessary the course of the lymphatics. If there is suspicion of leukosis, a blood sample must be taken for white cell count or for serological testing. In cases which cannot be clarified by these methods, a biopsy specimen may be taken.

Lymph nodes

The body lymph nodes are normally flaccid or tautly elastic, easily displaced and in one piece. During inspection and palpation attention should be paid to increase in size, tenderness, firm consistency, nodule formation and adhesion to surrounding tissues, as well as the occurrence of accessory lymph nodes. To palpate lymph nodes of the head and neck, the investigator stands at the animal's neck with one arm around the neck and palpates the following four lymph nodes on each side of the body simultaneously, comparing the two sides. The remaining lymph nodes are examined individually as follows.

Mandibular lymph nodes (lymphonodi mandibulares): in the intermandibular space between the anterior edge of the mandibular salivary gland and the mandible. Normal size between that of a hazel nut and almost that of a walnut. Drainage region: lower half of the head. Palpation by a claw-like grip (Fig. 123/1), taking care to distinguish from the multiple-lobed salivary gland. In their normal state these lymph nodes cannot be felt, being embedded in adipose tissue.

Parotid lymph nodes (lymphonodi parotidei): just below the mandibular* articulation medial to that part of the parotid salivary gland that is nearest the ear, and sometimes overlapping this at its anterior edge. It is roughly about the same size as the mandibular node and receives lymph from the upper half of the head. Palpated by the finger-tips in a claw-like grip around the dorsal extremity of the parotid gland just below the ear. Normally there is little more than a hint of the presence of this node.

¹In anatomical terms the functional unit draining a certain area, composed of one or more lymph nodes and their lymphatics, is called a lymph centre

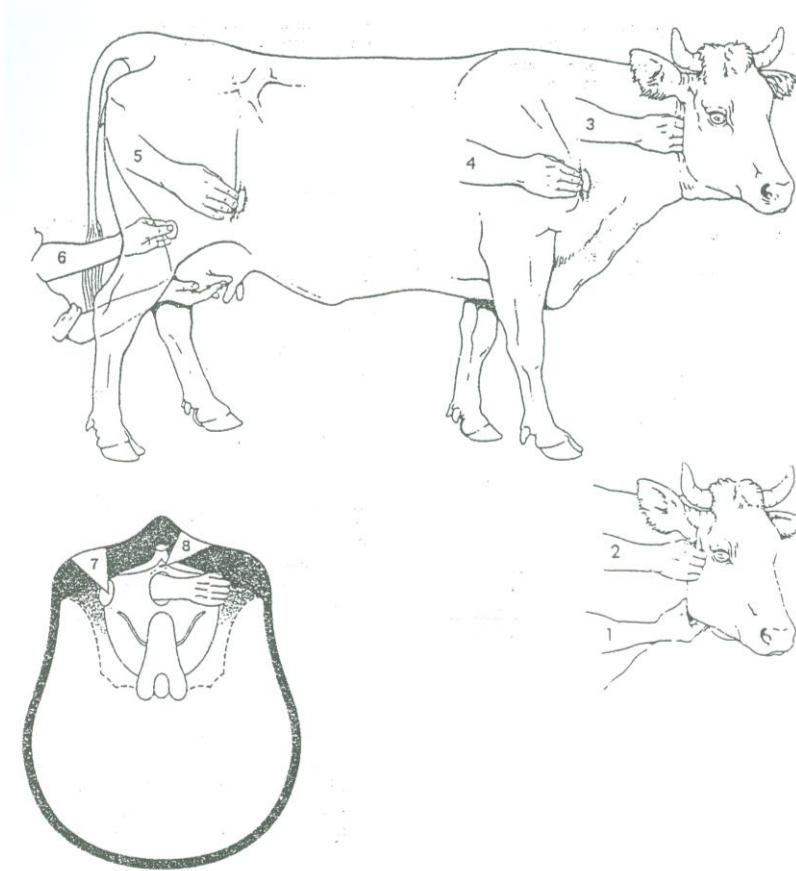


Fig. 123, 124. Above: palpation of externally accessible lymph nodes. = mandibular lymph node
 2 = parotid lymph node,
 3 = medial retropharyngeal lymph node, 4 = superficial cervical lymph node,
 5 = subiliac lymph node,
 6 = lymph node. Below, left: cranial View of the pelvic cavity, to show rectal palpation of iliofemoral lymph nodes (7) and lymph nodes of the aortic bifurcation (8)

Retropharyngeal (suprapharyngeal) lymph nodes (lymphonodi retropharyngei mediales): these lie posterior and dorsal to the roof of the pharynx and normally cannot be palpated. They receive lymph from the internal parts of the head, including the proximal oesophagus and larynx. For palpation the extended fingers of each hand are placed on either side of the head behind the ramus of the mandible and between the larynx and the vertebral column (Fig. 123/3). When an attempt is made to force the finger tips on each side towards each other, there should not be any solid body between them and the procedure should not cause stridor, providing there is no enlargement of the lymph nodes or other swellings (abscess, cellulitis, foreign body, neoplasm) around the roof of the pharynx, nor paralysis of the soft palate. The *external retropharyngeal lymph nodes* (lymphonodi retropharyngei laterales) are normally about the size of a hazel nut, and lie medial to (and are half covered by) the mandibular salivary gland. They collect lymph from all lymph nodes of the head. They cannot be felt normally, but can become extremely enlarged.



Fig. 125. Palpation of a subiliac lymph node that has become twice the size of a fist due to lymphatic leukosis obvious tumorous enlargement

Superficial cervical (prescapular) lymph nodes (lymphonodi cervicales superficiales) are covered by muscle just in front, and a little above, the shoulder joint. They are as long and as wide as a finger, and serve as the regional lymph centre for ear pinna, neck, chest and shoulder. Palpation is by sliding the tips of the extended fingers, under moderate pressure, forwards over the anterior edge of the shoulder, upon which the nodes should slip out or the way (Fig. 123/4).

Subiliac (prefemoral) lymph nodes (lymphonodi subiliaci) are situated at the upper end of the lower third of an imaginary line drawn from the tuber coxae to the patella. They are about the same size as, or a little larger than, the superficial cervical nodes and they collect lymph from the posterior part of the hindquarters and craniolateral segment of the thigh. Palpation is similar to that for the superficial cervical nodes, by pressing the fingertips forwards and inwards two handbreadths above the stifle (Fig. 123/5, 125).

Mammary lymph nodes (lymphonodi mammarii)² usually occur in cows, as two nodes on each side between the bony floor of the pelvis and the caudal margin of the udder. One is the size of a hazel nut or a walnut, while the other is the size of a pocket watch. Drainage area: udder, inside and posterior segments of the thigh. To examine the left nodes the left hand is used to support the weight of the udder while the right hand palpates the caudal margin of the udder from the midline outwards. The larger (posterior) node can usually be felt. A similar technique is used to palpate the right half of the udder (Fig. 123/6).

Scrotal lymph nodes (lymphonodi scrotales)² occur in bulls on each side caudal to the spermatic cords above the neck of the scrotum and under the abdominal wall; the size of a hazel nut or a walnut. They serve as the lymph centre for the external male genitalia (testis, epididymis, spermatic cord, penis and prepuce). Palpate from the rear, with the weight taken off the scrotum; they can normally be felt to the right and left of the S-shaped curvature of the penis, embedded within scrotal fat. Enlargement of the following lymph nodes, which normally cannot be seen or felt, to the size of a bean or a hazel nut is not always pathological: deep cervical (lymphonodi cervicales profundi), paralumbar (lymphonodi fossae paralumbalis) and other cutaneous lymph nodes. On the other hand, when the following lymph nodes become visible through enlargement,

it is always a pathological sign: anterior sternal (lymphonodi sternales craniales), axillary (lymphonodi axillares), popliteal (lymphonodus popliteus).

² Mammary and scrotal lymph nodes correspond to the superficial inguinal nodes of man. Together with the sub-iliac lymph nodes they form the lymphocentrum inguino-femorale

Among the internal lymph nodes, the following are accessible by rectal examination: iliofemoral (lymphonodi iliofemorales; synonymous with lymphocentrum iliofemorale), in the retroperitoneal space cranial and medial to the body of the ilium, the size of a large walnut or almost that of a hen's egg. They collect lymph from the subiliac, popliteal, mammary and scrotal lymph nodes as well as from thigh, loins and pelvis. They may be felt with the extended hand on each side of the pelvic inlet just in front of the upper part of the body of the ilium (Fig. 124/7).

Other lymph nodes accessible from the rectum are those at the bifurcation of the aorta —external and internal iliac (Lymphonodi iliaci mediales et. laterales, Fig. 124/8). Together with the normally undetectable sacral lymph nodes, they form the lymphocentrum iliosacrare. These and the nodes at the posterior end of the right longitudinal groove of the rumen (right ruminal lymph nodes) cannot always be felt, although they are normally the size of a large bean. The renal lymph nodes at the hilus of the kidney and the mesenteric lymph nodes can be palpated only when pathologically enlarged.

Lymph vessels

The subcutaneous and intracutaneous external lymph vessels can be seen and felt only when distended or when there are pathological changes in their walls. They then show up as-sinuous cords running in the direction of regional lymph nodes, and possibly bearing nodules or ulcers.

Sample collection

White blood picture. During clinical assessment of the lymphatic system, particularly in cattle suspected of having leukosis, it is important to know the total lymphocyte count per mm³ of blood. This is calculated from the leukocyte count and the proportion of lymphoid cells. Providing the age of the animal is known, the result can be compared with the data provided in a 'leukosis key' (Table 8). This can be used to supervise herds for

Table 8 Official leukosis key for the Federal Republic of Germany (EEC leukosis key)

age group	lymphocyte count per mm ³ of blood		
	normal	Moderately increased	Greatly increased
between 2 and-3 years	< 8500	8500-10500	> 10500
between 3 and 4 years	< 7500	7500— 9500	> 9500
between 4 and 5 years	< 6500	6500— 8500	> 8500
between 5 and 6 years	< 6000	6000— 8000	> 8000
over 6 years	< 5500	5500— 7500	> 7500

leukosis by regular testing of all members of the herd. Apart from quantitative data, the morphology and cytochemistry of lymphoid blood cells is only of secondary importance in the diagnosis of bovine leukosis. However, the presence of exceptionally immature or dividing cells (lymphoblasts, mitoses) is indicative of this disease. Details of the collection of blood samples and the white blood picture are provided in the chapter on the circulation (pages 120, 129).