

The Differential Diagnosis of Abdominal Findings (Adspection, Rectal Examination and Exploratory Laparotomy) in Cattle*

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Editor's Note: In this text, the term *inspection* is used when the examination is done by looking into a body cavity; *adspection* means looking at something from outside, e.g., viewing the shape of the abdomen from the rear. *Endoscopy* is the term used when viewing a body cavity by means of an instrument (endoscope) and not by the naked eye.

In the framework of the routine veterinary examination of internally sick cattle, rectal exploration of the abdominal cavity has always carried particular importance, since substantial and often even diagnostically decisive facts are ascertained.

The varied spectrum of intra-abdominal findings obtainable by this means has in recent times been further enriched by conditions such as displacement of the abomasum, caecum, intestinal viscera, as well as through liponecrosis, thus underlining the importance of such differential examination. A further motive, to present the various diseases discernible within the bovine abdomen, by schematic comparative drawings of their adspectory and palpatory findings, is derived from the fact that ruminotomies—thanks to the better prevention of hardward disease—are becoming less common, while clinicians and practitioners have become interested in diagnostic laparotomies. By this means, all intra-abdominal organs (not only those palpable via the rectum) are accessible for thorough palpation, usually leading to diagnostical clarification.

Occasionally one can conclude from the changed contour of the abdomen which illness is exhibited within the abdominal cavity. In Table 1 the most conspicuous of the observations (from behind) of differentiated adspectory findings are compiled:

- a. normal, extensive symmetrical outline of the abdomen;
- b. left flank "filled" or slightly bulging, with readily relapsing tympany with accumulation of gas bubbles in the dorsal rumen, as in a beginning anterior functional gastric stenosis or in piercing foreign body of the reticulum; with extreme left sided abomasal displacement, or with large, localized, intraperitoneal abscess (as a result of a laparotomy or

the use of a trochar) in the left dorsal quadrant of the abdominal cavity;

- c. pronounced tympany of the rumen with free gas in the dorsal sac, e.g., choke by esophageal blockage;
- d. overloading of the rumen with frothy ingesta, for example as a result of the excessive feeding of legumes;

- e. moderate relapsing tympany and simultaneous dilatation of the rumen with anterior functional gastric stenosis, likewise and occasionally even more pronounced with obstruction of the abomasum and hence retrograde stasis of the ingesta in the forestomachs because of advanced posterior gastric stenosis or any other hindrance to the passage of food through the abomasum (leucotic tumors or phlegmonic changes of the wall itself or the insertion area of the great or small omentum to the abomasum ("anatomic" pyloric stenosis);

- f. pyriform contour of the abdomen with symmetrical buoyancy in the ventral region in the case of ascites (hydrops ascites) or amniotic membrane edema (hydramnion, hydrallantois);

- g. all around taut and barrel shaped inflated abdomen, as in the case of advanced paralytic ileus with secondary rumen tympany;

- h. both "flanks" filled or slightly bulging in pneumo-peritoneum (e.g., after an earlier laparotomy, trocharotomy, abdominal puncture, penetrating injury to the abdominal wall, or in generalized septic peritonitis with gas formation);

- i. right flank "filled" or slightly bulging in high grade; right sided dilatation and torsion of the abomasum or of the caecum, intestinal volvulus, or in beginning paralytic ileus;

- j. the ventral third of the right abdominal wall more or less bulging in simple dilatation of the abomasum, without simultaneous displacement, sometimes also in advanced pregnancy.

The subsequent rectal examination should be done systematically. As the motility of the rectum can be impaired during the examination, owing to the aspiration of air ("ballooning") and reflectory contractions, it is advisable to palpate the more distant organs, that is those situated farthest forward in the abdominal cavity first. Next, with the palm of the hand directed dorsally, one palpates the left kidney and, in doing so, one has to pay attention to the size

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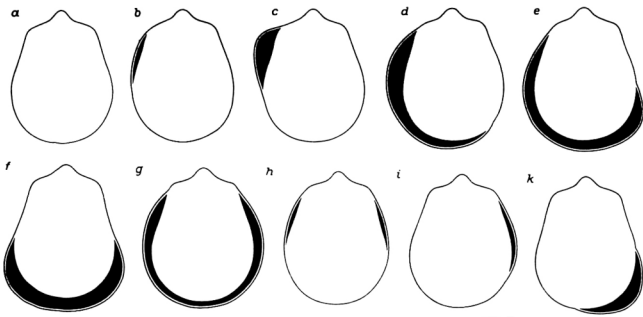


Table 1: Abdominal shape of cattle (caudal view, schematic).

and consistency, the surface and scope of the individual kidney lobes as well as the condition of the kidney bed. Using continual, cautious “worm-like” moving fingertips during the entire exploration, one should slide from cranial to caudal, between the dorsal rumen sac and kidneys, testing the free mobility of these organs. (In the presence of peritonitic adhesions one has—as in other areas of the abdominal cavity—to differentiate between fresh, fibrinous conglutinations and older fibrous coherences—the former, but not the latter, can still be easily loosened with the fingers.) Then, the extended fingers continue to feel over the dorsocaudal rumen sac and thereby check

the smoothness of its serous covering, the degree of filling as well as the consistency of the contents. With mixed hay concentrate rations one normally is able to palpate kneadable masses. (The beginner should be on guard not to mistake the “rough” to “nodular” appearing partially digested fodder palpable through the rumen wall for abnormal lesions on the serous membrane of the rumen.) The exploring hand slides then downwards on the medial wall of the rumen to the longitudinal groove, where the rumen lymph nodes are checked for enlargement (in a healthy animal these are either not or only with difficulty, palpable). The exploring arm of the investigator thus finds itself deep in the supraomental recesses in which—to the right of the rumen—the intestinal convolutions may be felt. Physiologically, individual intestinal loops are not clearly definable from each other; they appear rather as soft and easily movable masses. Still farther to the right, one finally arrives at the normally smooth, peritoneally covered abdominal wall of the right flank. Here, only under pathological conditions (namely in increased tension of the greater omentum) the caudal edge of the great omentum or (in extreme posterior displacement or enormous enlargement) the rear margin of the liver may be palpated.

During all these manipulations one has, in the ab-

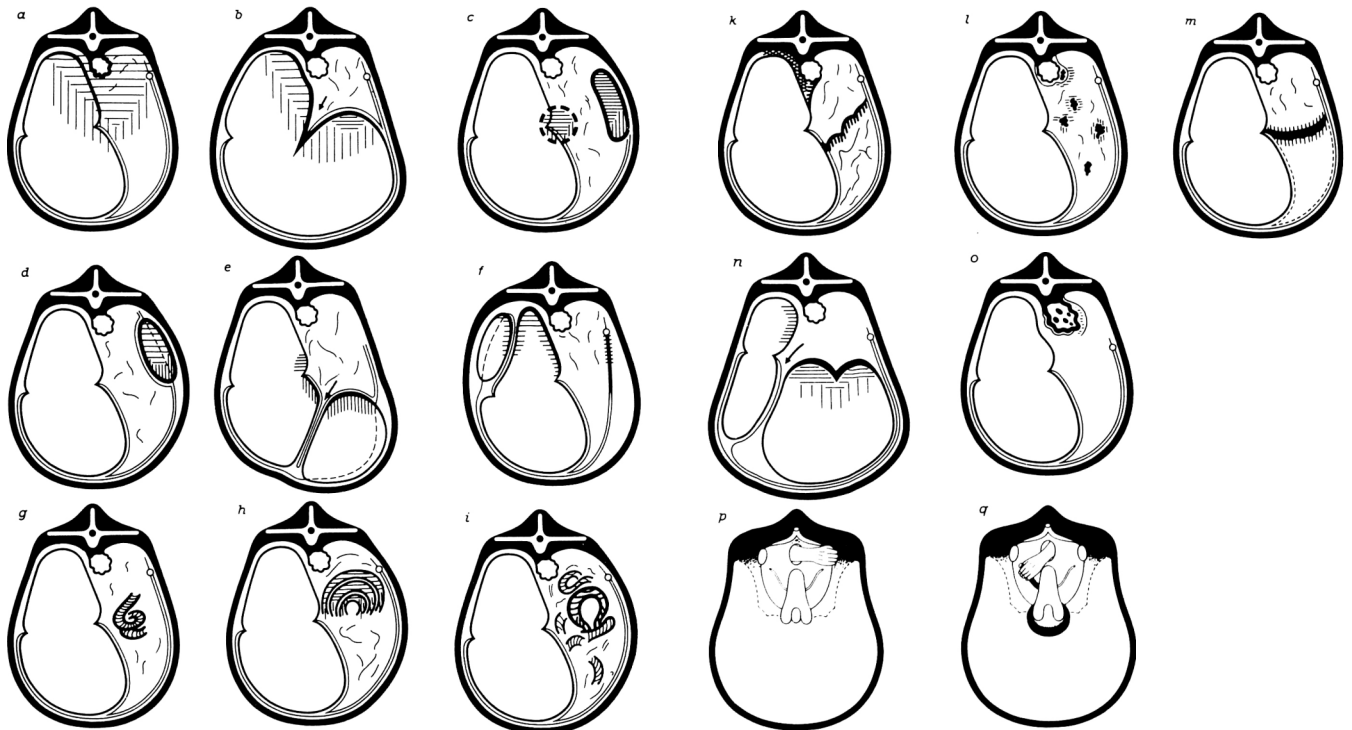


Table 2: Most important palpatory rectal findings in cattle (schematic, caudal view: illustrations a to o; cranial view: illustrations p and q).

Explanation of signs:

- normal contour of viscera
- abnormal conditions emphasized

- ≡ palpable without raising of the abdomen
- ≡≡ additionally palpable with raised abdomen
- ◆ peritonitic adhesions
- ♣ firm consistency
- ≈ flabby appearance

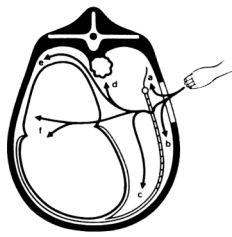


Table 3: Exploratory laparotomy from the right for direct palpation of the abdominal and pelvic viscera (caudal view, schematic).

dominal cavity of healthy animals, the feeling that the rectum is under a certain intra-abdominal suction, and finds itself in immediate contact with the neighboring organ; in the case of pneumoperitoneum however, one gets the impression that the rectum appears relaxed and is surrounded by “empty” space.

Having palpated the abdominal viscera situated more cranially, one draws the exploring hand slowly backwards and now palpates the organs lying within the pelvic cavity, and directly anterior to it, namely the caudodorsal sac of the rumen, the left abdominal wall, iliac lymph nodes, lymph nodes on the aortic bifurcation and this vessel itself, the urinary bladder and the uterus (the latter only clearly discernible in certain illnesses), internal genital organs as well as the connective tissue between the rectum and vagina. The differences between the normal and pathological findings of rectal exploration are emphasized by thick black lines in Table 2.

a. normal rectal condition;

b. anterior or advanced posterior functional gastric stenosis with overloading and distention of the rumen; in order to reach and feel the medial longitudinal groove between the dorsal and ventral sac of the rumen, it may be necessary to have the abdomen of the animal raised by two assistants using a pole (compare with Table 2n);

c. enlargement and torsion of the caecum: a taut, “tire-like” longitudinal balloon is found adjacent to the abdominal wall of the right dorsal quadrant; moreover, one can occasionally feel the bread-like form of the apex of the caecum a bit in front of the pelvis; mesenteric strands drawn toward the left also indicate a torsion of the caecum;

d. right-sided enlargement and torsion of the abomasum: sometimes, on the surface of the organ (resembling a tightly filled balloon), the attachment lines of the abomasal mucosal folds (appearing as parallel grooves) or, as shown in the drawing, the attachment of the greater omentum (as a thin waist) can be felt;

e. high-grade enlargement and obstruction of the nondisplaced abomasum (the organ being palpable from the rectum only in extreme cases and with the abdominal floor raised);

f. unusually enlarged abomasum displaced to the left: as a rule the abomasum is not palpable from the rectum when it is displaced to the left; however, in this condition, as seen in the illustration, the sharp-edged caudal margin of the greater omentum may be

felt quite often as a strand drawn craniodorsally;

g. intussusception of the small intestine: a spiral coil consisting of one or two intestinal loops with firm (“fleshy”) consistency is to be felt in pregnant animals only after lifting the abdomen, otherwise usually to the left, directly in front of the pelvic inlet and—in contrast to the normal palpatory findings of the intestine—can be grasped with the exploring hand;

h. torsion of the mesentery, i.e., of the whole intestinal loops—in the right half of the abdominal cavity; tightly distended and concentrically parallel running intestinal loops of the colon spiral as well as stretched cords of mesentery are to be felt;

i. intestinal incarceration, here due to mesenteric rupture (volvulus by hernia mesenterialis) of the small intestine: intestinal loops of firm fleshy consistency, others tightly filled with gas, and stretched parts of the mesentery are palpable together;

j. generalized peritonitis: fibrinous (“grating”) conglutinations or fibrotic (solid) adhesions between the kidneys and the rumen (therefore one cannot be differentiated from the other) as well as in the area of the intestinal convolutions (which appear more or less consistent and immovable);

k. fatty tissue necrosis (liponecrosis): one or more, wax-like to hard irregular nodes can be felt in the kidney bed, in the mesentery and/or in the greater omentum;

l. omental bursitis extending to the pelvic inlet: ventral and anterior to the pelvic crest one feels, usually only with the abdomen raised, a transversely running firm swelling (caudal fold—margin of the greater omentum) which under certain conditions may exhibit central fluctuation (pus) and usually adheres to neighboring organs;

m. amniotic membrane edema: to the right of the rumen (which is displaced to the left) a great fluctuating “mountain-like” balloon is palpable which, contrary to the findings in distention of the rumen, may be differentiated from the latter even when the abdomen is raised (see also Table 2b);

n. with progressive amyloidosis, pyelonephritis or leucosis of the kidney, this organ is enlarged and often appears rather more compact than normal; with passive congestion of the urine from the bladder to the ureter, and with intense recent purulent glomerulonephritis, retroperitoneal infiltration of urine into the fat of the kidney bed occurs, which thus obtains a flabby consistency;

o. palpation of the lymph nodes on the aortic bifurcation, as well as of the iliac lymph nodes, particularly in regard to enlargement caused by leucosis;

p. pathologically increased filling of the tautly fluctuating (and on occasion also thick-walled) urinary bladder as well as inflammatory induration and enlargement of the right ureter.

In a case where intra-abdominal changes cannot be positively interpreted by rectal palpation, or when the focus of disease is suspected to be localized farther cranially, i.e., out of reach by rectal palpation, a clear diagnostic result is usually obtained

through an exploratory laparotomy. In some cases this operation allows therapeutic measures to be taken with the disease organ itself; in other cases it leads to prompt decision for a profitable sale rather than protracted, pointless (and therefore hopeless) attempt at treatment.

The diagnostic "intervention" should be undertaken from the left flank only if one wishes to keep a way open for a later ruminotomy. Otherwise one usually opens the abdominal cavity, as shown in Table 3, from the right. The investigating hand then enters from the laparotomy incision (which suitably should be protected by a special rubber or plastic cover with a central circular sleeve) to palpate cranially into the abdominal cavity (arrow a), in order to palpate the liver, gall bladder, abomasum (parietal surface) and omasum. Then the hand—still remaining lateral to the greater omentum—slides ventrally and caudally (arrow b), where one may check the peritoneal fluid, omental bursa, as well as the pelvic organs. Now the exploring arm detours the greater omentum (the caudal edge of which is thereby pushed cranially) and is advanced cranioventrally towards the abomasum (visceral surface), omasum and reticulum (arrow c) and—still remaining within the supraomental cavity—dorsally towards the kidneys and ureter (arrow d). Finally one penetrates into the area between the forestomachs and the left abdominal wall by passing caudodorsally over the rumen (arrows e and f) where the spleen, and—in the case of the left sided displacement—the abomasum are to be felt.

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Brief Summary:

Description: Bo-Se is an emulsion of selenium-tocopherol for the prevention and treatment of White Muscle Disease (Selenium-Tocopherol Deficiency) syndrome in calves, lambs and ewes, and as an aid in the prevention and treatment of Selenium-Tocopherol Deficiency in sows and weanling pigs. Each ml. contains: sodium selenite (equivalent to selenium 1 mg.) 2.19 mg., Vitamin E (as d-alpha tocopheryl acetate) 50 mg. (68 I.U.), polysorbate 80 250 mg., thimerosal (preservative) 0.1 mg., water for injection q.s. Sodium hydroxide and/or hydrochloric acid may be present to adjust pH. **Indications:** Bo-Se is recommended for the prevention and treatment of White Muscle Disease (Selenium-Tocopherol Deficiency) syndrome in calves, lambs and ewes. Clinical signs are: stiffness and lameness, diarrhea and unthriftiness, pulmonary distress and/or cardiac arrest. In sows and weanling pigs, as an aid in the prevention and treatment of diseases associated with Selenium-Tocopherol Deficiency such as Hepatic Necrosis, Mulberry Heart Disease and White Muscle Disease. Where known deficiencies of selenium and/or Vitamin E exists, it is advisable, from the prevention and control standpoint, to inject the sow during the last week of pregnancy. **Warnings:** Discontinue use 30 days before the treated calves are slaughtered for human consumption. Discontinue use 14 days before the treated lambs, ewes, sows and pigs are slaughtered for human consumption. **Caution:** Selenium is toxic if administered in excess. A fixed dose schedule is therefore important (read package insert for each selenium-tocopherol product carefully before using.) **Precautions:** Selenium-Tocopherol Deficiency (STD) syndrome produces a variety and complexity of symptoms often interfering with a proper diagnosis. Even in selenium deficient areas there are other disease conditions which produce similar clinical signs. It is imperative that all these conditions be carefully considered prior to treatment of STD syndrome. Elevated SGOT and creatine levels may serve as aids in arriving at a diagnosis of STD, when associated with other indices. **Important:** Use only the selenium-tocopherol product recommended for each species. Each formulation is designed for the species indicated to produce the maximum efficacy and safety. How supplied: 30 ml. and 100 ml. sterile, multiple dose vials. **Caution:** Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian.

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