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REPRODUCTIVE DISEASES OF THE BACKYARD HEN

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Abstract

Reproductive diseases commonly occur in backyard hens, and the underlying cause is usually different from that of commercial-production hens. Because backyard hens typically live longer, are usually provided an adequate diet, and have relatively more space than commercial hens, the most common causes of their reproductive disease include neoplasia, egg-related peritonitis, persistent right oviduct, and old age. Conversely, other reproductive diseases including vent trauma and depletion of calcium are rarely diagnosed. Copyright 2015 Published by Elsevier Inc.

Key words: backyard poultry; hen; reproductive disease; neoplasia; egg-related peritonitis; persistent right oviduct

Backyard hens are brought to avian veterinarians more frequently now than ever before. In response, veterinarians are seeking to increase their knowledge and level of care for backyard poultry. The veterinarian should first refer to one of the many general avian textbooks that are available to gain avian knowledge regarding general husbandry and care, handling, approach to medicine and surgery, evaluation of radiographs, and anatomy and physiology.¹⁻⁵ Most backyard poultry are initially maintained for their ability to lay eggs, consequently female reproductive problems are a common presenting complaint. The following is an overview of how to identify and treat some of the most commonly encountered female reproductive diseases of backyard poultry.

EGG-RELATED COELOMITIS

Egg-related coelomitis describes an acute or chronic, usually diffuse, coelomitis involving egg yolk, egg albumin, and/or eggshell occurring with or without bacterial infection (Fig. 1A and B). The older term “egg yolk peritonitis” has fallen out of favor as birds have a coelom rather than a peritoneum, and the offending substance can be not just the yolk of the egg but other parts of the egg. It is common for chickens to have some degree of egg-related coelomitis, and mild cases are commonly encountered at necropsy in production hens. Generally, chickens tolerate mild peritonitis better than parrots. Causes usually involve retrograde movement of shelled or shell-less eggs

from the oviduct back into the coelomic cavity because of oviductal bacterial infection, oviductal impaction, or abnormal confirmation of the oviduct. Heavy-production hens or those with inadequate calcium in their diet can have calcium depletion and uterine inertia leading to retrograde flow of egg material. Bacterial infections commonly involve *Escherichia coli* migrating up the oviduct from the vent.

Clinical signs of egg-related coelomitis can be obvious, such as a sudden decrease or cessation in egg laying, can be nonspecific, or can appear unrelated to the reproductive tract such as lethargy, partial anorexia, weight loss, and even lameness (Fig. 2). Physical examination findings can include

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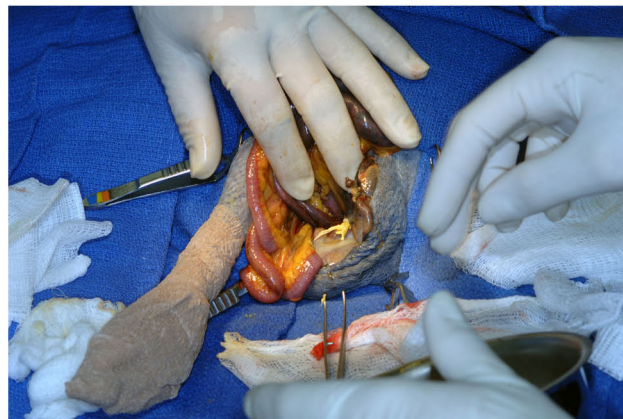
a bird with cachexia, increased respiratory and heart rates, crackles in the lower respiratory tract, a large doughy coelomic cavity, fluctuant coelomic fluid, and an undiagnosed lameness. Lameness may be caused by attempting to walk with a significantly distended coelom, weakness, and/or pain.

Diagnosis of egg-related coelomitis is based on typical clinical signs and radiographic images. Endoscopy is possible but may be hampered or risky owing to coelomic fluid and limited air sac space. Radiographically, a large variety of findings can be observed such as the ground-glass appearance of coelomic fluid, multiple or single-shelled or shell-less eggs inside or outside the oviduct, herniation of the abdominal musculature or an expanded coelomic wall, thickened air sacs, and masses in the caudal thoracic and abdominal air sac area. Lateral and ventrodorsal radiographic images taken with the patient under general anesthesia are recommended (Fig. 3). If the goal of radiographic imaging is simply to determine if an egg (or eggs) is present or not, then having the bird remain in a standing position for the procedure is adequate (Figs. 4 and 5). A lateral beam across the table is used for a standing lateral view. Fluid obtained for analysis by coelomocentesis may be helpful and can also be used for bacterial culture. Ultrasonography can be used to determine if the eggs are free within the coelomic cavity or positioned in the oviduct (Fig. 6). A complete blood count and plasma chemistry profile, including total and ionized calcium, can be performed to determine the degree of infection or inflammation, amount of dehydration, liver or kidney disease, and/or calcium status.

Recommended treatment for egg-related coelomitis can involve fluid and antibiotic therapy, nonsteroidal anti-inflammatory drugs, butorphanol, and/or surgery. Follow label instructions for drug therapy, or if used "off label," then consult www.farad.org regarding extralabel drug use, as there may be an acceptable withdrawal time. Never use a fluoroquinolone (e.g., enrofloxacin), cephalosporin, chloramphenicol, or metronidazole, as these drugs are prohibited for use in any food animal even if that individual will not be used for food. The reason these drugs are prohibited from any use is to prevent the formation of antibiotic-resistant *Campylobacter* spp., not necessarily owing to concern over withdrawal times.

Surgery involves sterile technique and adequate monitoring of the patient while under anesthesia (Figs. 7-10). The difficult decision in mild cases of

A



B



C



FIGURE 1. (A and B) Intraoperative photographs of a 1-year-old white bantam Silkie hen with egg-related coelomitis. The forceps are holding egg-related material from her coelom. (C) A total of 3 whole soft shelled eggs and 3 egg remnants that were loose within the coelomic cavity (not in the oviduct) were removed.

egg-related coelomitis is whether surgery will provide a better outcome than antibiotics and analgesic therapy alone. Generally, the more severe the egg-related coelomitis, the more likely the surgery will provide a better outcome than



FIGURE 2. A 2-year-old Speckled Sussex hen presented for lameness was found on physical examination to have a distended, doughy coelomic cavity suggestive of egg-related peritonitis. There was also a recent history of cessation of egg laying. Within 1 week of starting trimethoprim sulfamethoxazole and meloxicam orally, she was ambulating normally and continued to do well, including eventually laying eggs again.

conservative measures, especially if eggs are free within the coelomic cavity. Some clients choose not to have surgery performed on their hens with mild to moderate egg-related coelomitis, and the hens may or may not respond to conservative therapy alone. Oviductal impaction should be resolved with surgery to remove the egg material before it adheres to the oviduct. Calcium supplementation is usually not required as egg-related coelomitis is rarely due to hypocalcaemia and/or oviductal inertia in backyard hens, but it can be given as there is minimal to no adverse effects from giving one calcium injection.



FIGURE 3. A Buff Brahma hen intubated under isoflurane anesthesia and being positioned for a lateral radiograph.

A gonadotropin-releasing hormone agonist (e.g., leuprolide acetate injections or deslorelin implants) can be used to hormonally decrease or stop egg laying; however, light cycle modification, such as 10 hours of light and 14 hours of dark, and keeping the hen away from other egg-laying hens also must be implemented. When separating the hen from other birds, the animal should not be isolated as this is stressful and not recommended. After one 4.7-mg deslorelin implant was placed subcutaneously in Japanese quail, it caused cessation of egg laying for approximately 70 days in 6 of 10 birds when compared with a placebo group.^{6,7} In a similar study, two 4.7-mg deslorelin implants or one 9.4-mg implant were placed subcutaneously in Japanese quail, causing significantly reduced egg production from week 1 to week 15 and week 12 to week 26 after implantation, respectively, when compared with the placebo group.⁸ It is interesting to note that 3 quails in each treatment group continued to lay eggs throughout the study period. After administration of hormones, any eggs produced by treated hens should be discarded, and the owner must differentiate the treated hen's eggs from the untreated birds or figure out a way to separate her or her eggs from other birds (some even use a chicken diaper).

CYSTIC RIGHT OVIDUCT

Cystic right oviduct (CRO) occurs in commercial chickens but appears to be more common in backyard poultry.⁹ Embryologically, the right oviduct should regress, but if partial development occurs, then a CRO forms. Clinical signs of CRO in chickens include vague signs of weakness, lethargy, decreased appetite, decreased or cessation of egg laying, and most notably a large, fluctuant coelomic cavity. A tentative diagnosis can be achieved through coelomocentesis and aspiration of an opaque yellow fluid. Radiographic imaging can confirm the presence of coelomic fluid. An ultrasonographic examination will also confirm the presence of coelomic fluid and may reveal discrete pockets of fluid or cysts in the midcoelomic area. Cysts associate with CRO can be large, up to 10 × 20 cm² in size.

Recommended treatment for CRO is exploratory coelomic surgery and removal of the cysts and fluid (Fig 11). Prognosis for treatment resolution of CRO is fair to poor. Throughout the physical examination, radiographic imaging, and surgery, it is best that the bird not be positioned completely on its dorsum as it may drown in its own fluids if



FIGURE 4. Standing ventrodorsal radiograph of a 3-year-old black star sex-linked hen presenting for cessation of egg laying, lethargy, and partial anorexia. On physical examination, she had a large, fluctuant coelomic cavity with 2 palpable egglike firm masses. Ideally, orthogonal views should be taken in an anesthetized bird. The purpose of this 1 radiograph was to determine if these were indeed eggs before surgery. A total of 3 inspissated eggs were removed that were loose within the coelomic cavity. Ideally, the uterus should be removed as well at surgery to prevent further reproductive disease.



FIGURE 5. Same 1-year-old white bantam Silkie hen with egg-related coelomitis from Fig. 1. Only standing awake radiographs were taken, as the goal was to confirm the presence of eggs and not diagnose egg-related peritonitis. This lateral view was taken with her standing and angling the beam across the table. She had 3 whole soft shelled eggs, and 3 egg remnants were loose within the coelomic cavity (not in the oviduct) (see Fig. 6).

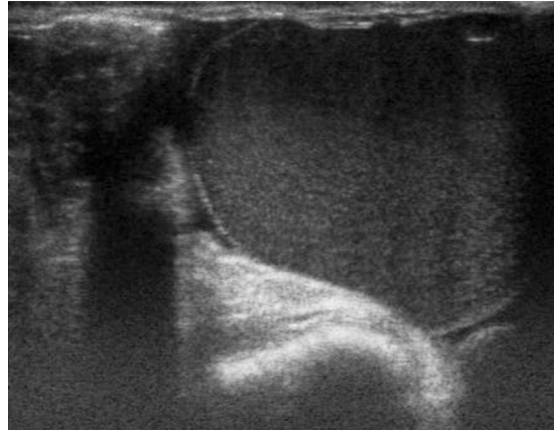


FIGURE 6. Same 1-year-old white bantam Silkie hen with egg-related coelomitis from Figures 1 and 4. Ultrasonographic photograph of an egg loose within the coelomic cavity. Only at surgery could it be determined that she did not have a hernia but a greatly expanded, stretched coelomic wall.

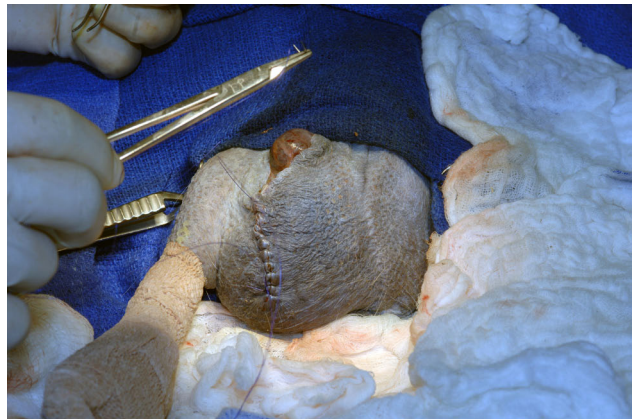


FIGURE 7. Intraoperative photograph of the 1-year-old white bantam Silkie hen described in Figure 1 showing closure of the skin incision using a continuous Ford interlocking pattern. This incision was longer than usual owing to her greatly expanded coelomic cavity wall.



FIGURE 8. Pulse oximeter clamp properly positioned on the toe of a chicken.



FIGURE 9. Pulse oximeter clamp properly positioned over the tarsal pad of a duck. Also, note the Doppler probe taped over the medial metatarsal artery. It is best to have redundant monitoring equipment in place in case 1 or more fail to function.

any of the coelomic fluid makes it to the ostium of the caudal thoracic air sac. Secondary infection can also occur in these cases, as well as other concurrent diseases (Fig. 12).

NEOPLASIA

Neoplasia is common in backyard poultry that are allowed to live to an old age and/or exposed to lymphoid leukosis (LL) virus. The 2 most common forms of neoplasia affecting the female reproductive tract of backyard hens are LL and ovarian carcinoma, but carcinomatosis and other neoplasia also can occur. Both LL and ovarian



FIGURE 10. Same duck as in Figure 9 showing an intravenous catheter in the cutaneous ulnar vein (basilic vein or wing vein). Also in the photograph is a properly positioned “right arm” ECG lead. ECG, electrocardiography.

carcinoma present with similar clinical signs of lethargy, weakness, decreased appetite, decreased or cessation of egg laying, and an enlarged firm coelomic cavity. Radiographic imaging and ultrasonography can confirm a tissue mass or masses in the coelomic cavity. Currently, no treatment is available for chickens that present with LL or ovarian carcinoma.

Lymphoid leukosis is caused by a retrovirus that affects only chickens and is associated with neoplastic masses in a variety of tissues including the reproductive tract. Clinical signs usually occur in older chickens at approximately 24 to 40 weeks of age. The clinical signs associated with LL are nonspecific and include anorexia, weakness, pale comb, and distended abdomen. Gross necropsy findings in hens with LL can include gray to white tumors involving the liver and other organs. The clinical signs of LL are sometimes difficult to differentiate from those of Marek’s disease; however, LL does not occur before 14 weeks of age, and Marek’s disease usually occurs at 10 to 12 weeks of age. Most hens start to lay eggs at approximately 18 to 20 weeks of age. The best way to prevent LL in a group of chickens is testing them and culling positive breeder birds.

Ovarian carcinoma typically occurs in birds that are more than 2 years of age, with affected hens presenting with clinical signs similar to those with LL (Fig. 13).

Presently, no treatment is available for avian ovarian tumors. Diagnosis is based on palpation of a mass, histopathologic evaluation of an ovarian mass with aspiration or biopsy, radiographic evidence of a tumor, or surgical exploration of the coelomic cavity. Most birds are killed. An exploratory coeliotomy can be performed, and if an inoperable neoplastic mass is identified, euthanasia is recommended while the patient is anesthetized.

INFECTIOUS BRONCHITIS VIRUS

Infectious bronchitis (IB) in chickens is caused by a coronavirus and is not common in backyard poultry. However, a description is included in this article because IB does affect the female reproductive tract and can result in hens producing irregular and roughened eggshells with watery albumin and decreased egg production. Younger immunosuppressed chickens will exhibit clinical signs of greater severity than usually observed in older immunocompetent chickens. IB is an upper respiratory disease that is highly contagious.

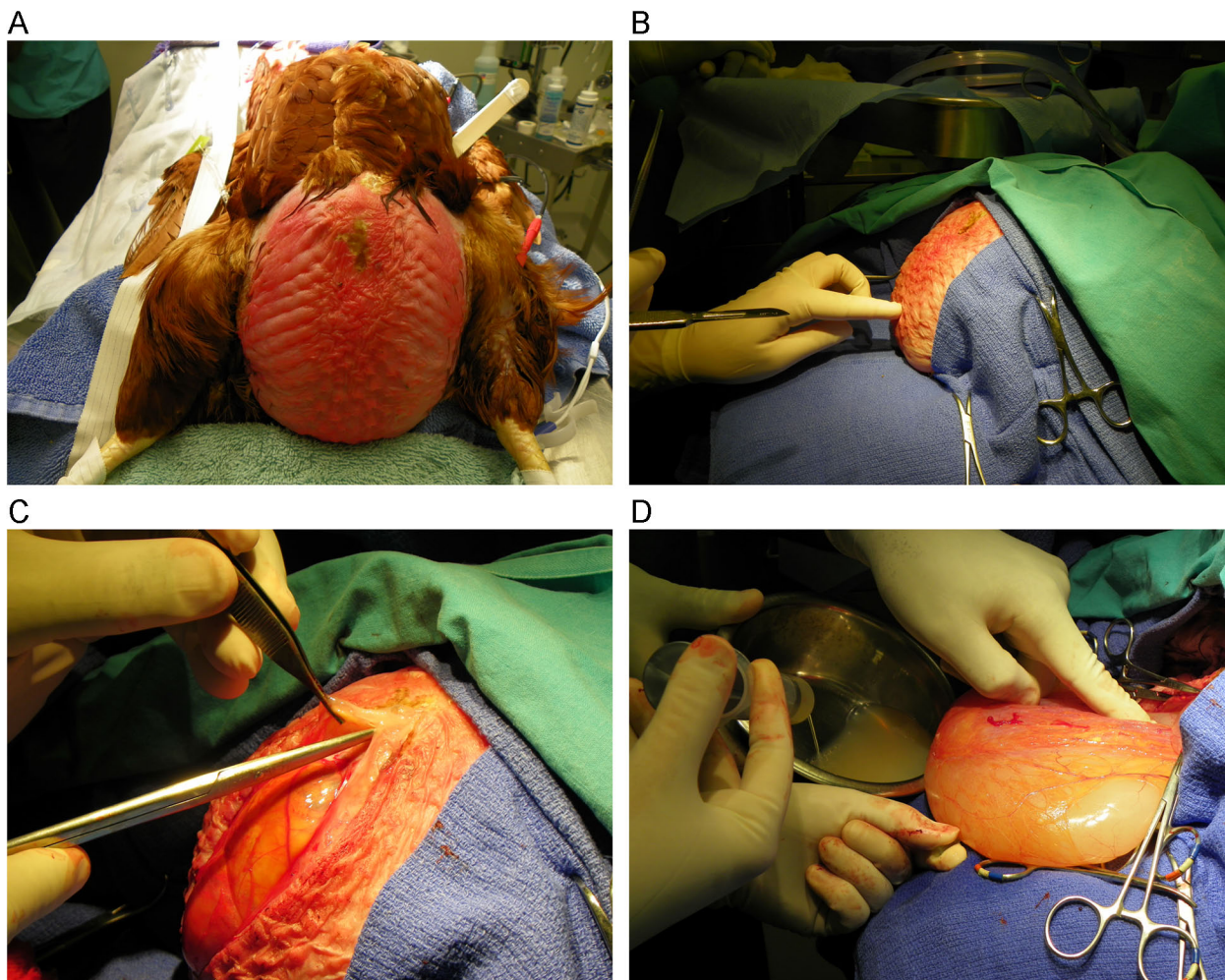


FIGURE 11. Intraoperative photographs of a hen with cystic right oviduct. (A) Note the positioning of the bird in almost a 45 degree angle to prevent possible drowning in fluids. (B) Proper draping is necessary to maintain sterility. (C) Incision made in the skin showing the vascular and cystic nature of the cyst. (D) Removing the fluid first by catching it in a bowl will allow better visualization of the remainder of the coelomic cavity.

Chickens typically develop clinical signs within 36 to 48 hours after exposure, and the signs last for approximately 4 days. Infected older chickens will have a 5% to 10% decrease in egg production for approximately 10 to 14 days. Diagnostic tests available for IB include virus neutralization, hemagglutination inhibition, and enzyme-linked immunosorbent assay. The best method to control and prevent exposure to the IB coronavirus is to disinfect and repopulate, and in commercial populations, use a commercially available live vaccine. Use of the IB vaccine in backyard poultry is not recommended. There is no recommended treatment for infected birds exhibiting clinical disease signs.

ABNORMAL EGG PRODUCTION

Many diseases can cause abnormal egg production including bacterial infections. One example of abnormal egg production is when older birds lay eggs with blood or meat spots inside. With senescence comes decreased or cessation of egg laying. Typically, a hen lays the most eggs during the first year of sexual maturity, whereas in the second year fewer eggs are laid, and during the third and fourth years there is a significant decrease in egg production. Most hens do not produce eggs after 5 years of egg laying. Age-related cessation of egg laying is different from the “spent hen” of commercial production, which is caused by



FIGURE 12. Gross necropsy photograph of a chicken with a noncalcified egg obstructing the left oviduct and a cystic right oviduct. The cystic right oviduct was much more fluid filled and occupied a majority of the space within the coelomic cavity before this picture was taken. Photograph courtesy of Dr. Linden Craig, University of Tennessee.

hypocalcemia and nutritional deficiencies by 2 years of age. Many backyard poultry are pets that happen to lay eggs and are maintained well past the point of optimum egg production. Also, decreasing day length decreases egg production; therefore, egg production is reduced in fall and winter.

THIN-SHELLED, SOFT SHELLED, OR SHELL-LESS EGGS

Thin-shelled, soft shelled, or shell-less eggs are usually produced owing to inadequate calcium supplementation. Laying hens should be on an optimum-laying ration. Layer diets have higher calcium and protein levels than maintenance formulations. If the layer ration comprises 90% of the total diet, then no supplemental calcium

is required. Crushed oyster shell is routinely used for calcium supplementation for laying hens. In heavy-production, commercial laying operations, calcium depleted eggs are more common and often called “caged layer fatigue.” Birds diagnosed with “caged layer fatigue” will present with weight loss, weakness, hypocalcemia, and feather loss. Dystocia or egg impaction is likely in a hypocalcemic hen owing to oviductal inertia. The dysfunction of the oviduct, through inadequate muscle contraction, occurs because calcium is required for proper muscle contraction. Treatment of hypocalcaemia is to correct the bird’s diet and administer intramuscular calcium gluconate at a dose of 30 mg/kg.

BROODINESS

Many breeds of chickens maintained in backyard flocks are egg layers that have been bred to lay eggs but not sit. Broodiness describes a hen that sits on her eggs; therefore, the bird does not lay more eggs and has a decreased appetite. Broodiness is desired if the owner wants breeding birds.

CLOACAL OR UTERINE PROLAPSE

Although it is normal for the cloaca to slightly prolapse immediately after egg laying, the everted

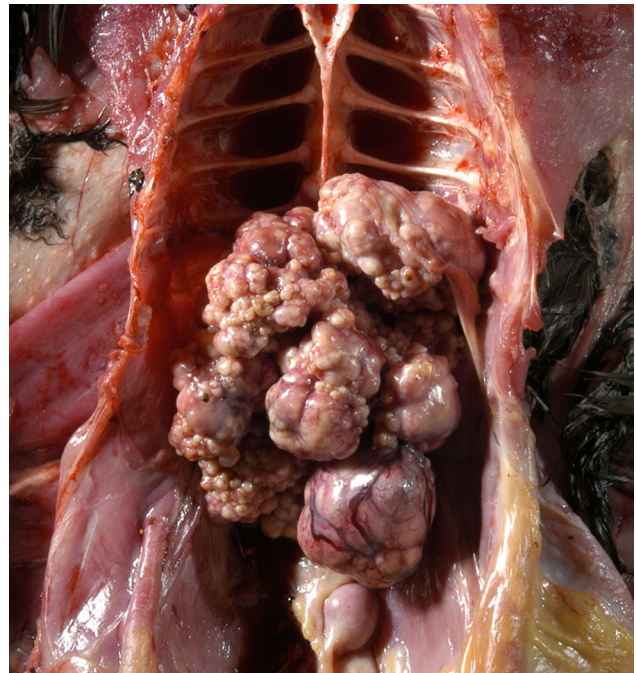


FIGURE 13. Gross necropsy of a turkey with ovarian carcinoma. Photograph courtesy of Dr. Linden Craig, University of Tennessee.

tissue usually returns to its normal position within minutes. Cloacal or uterine prolapse is more common in commercial heavy-production hens where crowded conditions and cannibalistic behavior is present, resulting in pecking of the vent by other hens. This condition is not diagnosed in backyard poultry but may occur in certain birds under specific circumstances (e.g., significant egg laying and nutritional deficiencies).

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