



# A Basic Introduction to Backyard Poultry Medicine

## – Part 1 of 3: Basic Anatomy & Physiology and Preventative Healthcare

**AK Ameen (BVSc)**

The question of where our food comes from has been an increasing trend over the last few years. In response to this, there has been a resurgence in homegrown produce and an increase in the number of people keeping backyard poultry for a self-sufficient supply of eggs and meat. Not only do backyard poultry produce fresh food, they are also a great disposal system of kitchen waste, can teach children a great deal about the role of animals in feeding the human population, and provide fascination and enjoyment for those who keep them. Backyard poultry frequently become an important part of the family and are often seen as much-loved pets. There is also a thriving community of poultry keepers interested in the breeding and exhibition of these birds, which are often very beautiful.

When a backyard bird becomes ill, their owner expects access to caring and competent veterinary care. Unfortunately, the veterinary profession has, in some places, struggled to live up to this expectation. There are three main reasons for this. Firstly, whilst backyard poultry are considered pets, their ability to produce safe food (especially in the case of laying chickens) remains a key part of their value to their owners, and this could be a conflict in treatment terms. Secondly, many practitioners have been unwilling to treat pet poultry due to their lack of knowledge and, thirdly, traditional poultry medicine is geared at treating the flock rather than the individual bird.

The types of poultry that a practitioner is likely to encounter in South Africa could include chickens, turkeys, ducks, geese, pheasants, peacocks, guinea fowl and quail.

Anatomy and Physiology:

### External features:

Avian skin is very thin and lightweight under the plumage but thicker on the feet and around the beak to resist mechanical stress. The epidermis contains keratinocytes which secrete a thin lipid film that helps in the maintenance of the plumage. The dermis is thinner than that of mammals and is composed of connective tissue.

The feathering or plumage of birds can weigh 2-3 times as much as the skeleton. Featherless regions are also present and may be filled with down. These featherless regions are used for heat dissipation and allow wing and leg movement.

Moult is the replacement of feathers and occurs because the emerging feather ejects the old feather from its follicle causing it to be shed. Birds usually moult in a sequence: the inside primary feathers moult first and the rest of the wing feathers then moult in a staggered manner, so that there is only a small reduction in flight power. Moulting is triggered by the time of year, light, breeding, nutrition, and temperature, and is controlled by thyroidal and gonadal hormones. Adult birds usually moult once a year after breeding when the levels of oestrogen and androgen drops. Drakes and ganders moult twice a year. Domestic fowl usually

moult in the autumn after approximately 50 weeks of egg laying. Moulting frequency is reduced in chicken breeds developed for high egg production. Moulting is a time of intense physiological pressure for birds. The metabolic rate of a moulting bird has to increase by 15-25% to compensate for the huge drain on energy and protein reserves.

### Musculoskeletal system:

The skeleton is lightweight for flying but extremely strong with a fused vertebral column and limbs. Major bones such as the humerus, femur, coracoid, pelvic girdle, sternum, and vertebrae are pneumatic with air sacs extending into the medullary cavities. The forelimb is modified to form the wing, whilst the beak and long neck are heavily involved in food prehension.

### Body cavities:

The lack of a diaphragm means there is no thorax and abdomen, but just one body cavity called the coelom. The coelom contains 16 separate cavities: one pericardial cavity, two pleural cavities, eight air sacs and five peritoneal cavities. The pleural and pericardial cavities resemble those seen in mammals, whilst the peritoneal cavities are unique to birds. These cavities are of significance as they may influence the spread of disease throughout the coelom.

### Cardiovascular system:

Birds have a high-performance cardiovascular system for flapping flight. As they have such high aerobic demands, the avian heart is 50-100% larger than mammals of a similar size. Birds also have a much higher cardiac output to pump large volumes of blood to the wings, head, and flight muscles. This is achieved by a high stroke volume, fast heart rate (resting rate 160-280 bpm) and slightly lower peripheral resistance. Birds also have stiffer arteries to improve blood flow and maintain high blood pressure.

### Respiratory system:

The ability to fly means that birds have much higher oxygen demands than mammals. Avian lungs are 10 times more efficient than mammalian lungs in absorbing oxygen. They have small, fixed lungs which change little in volume during breathing, and air sacs, which act as bellows but do not participate in gas exchange. This segregation of ventilation and gas exchange helps to increase the total gas exchange surface area by more than 20% compared with mammals. The bellows system also allows more efficient continuous one-way air flow as opposed to the in-and-out tidal flow of mammals.

### Gastrointestinal system:

To facilitate weight reduction for flight, birds have a crop and gizzard instead of heavy teeth. The GIT is thus adapted to process unmasticated food. Food is softened and stored in the crop before

being passed to the gizzard where it is mechanically broken down. Herbivorous birds (such as domestic fowl) also have large caeca to aid cellulose breakdown.

#### Urinary system:

The urinary system consists only of the kidneys and ureters; in keeping with weight reduction. Birds have no bladder or urethra.

#### Reproductive system:

The seasonal reproductive cycle of birds is controlled by the hypothalamus, which in spring responds to increasing photoperiod. This stimulates the release of GnRH via the bloodstream to the pituitary gland. The pituitary gland then releases FSH and LH, which triggers gonadogenesis, ovulation and breeding. After the breeding season, the shortening daylight length in late summer causes gonad regression and allows time for moulting.

Domestication and selective breeding have produced birds that have a prolonged reproductive period and can lay almost daily for 280-300 days over a 50-week period, followed by a period of moult. The domestic hen reaches sexual maturity at about 16-20 weeks of age. Eggs are not laid at the same time each day as ovulation-oviposition is approximately 25 hours (range 24-28 hours). Turkeys and pheasants follow a similar pattern whilst ducks and guinea fowl lay every 24 hours.

#### Eyes:

Birds have excellent vision due to large eyes, well-developed optic nerves and large optic lobes in the brain. Birds are tetrachromatic and so have excellent colour vision (they can see the primary colours and the ultraviolet spectrum). There is complete decussation of the optic nerve fibres at the optic chiasma, which means that each eye moves independently and there is no consensual light reflex.

#### Preventative Healthcare

As in other fields of veterinary medicine, strives should be made to move from a reactive healthcare program to a preventative one.

#### Health Plans:

By considering and formulating a health plan, poultry keepers will become more in tune with the needs of their flocks. A health plan should consider the following:

- Housing
- Outdoor ranges
- Feeding and water
- Flock behaviour
- Procedures for introducing new birds
- Hygiene practices
- External disease risks
- Predation risks
- Identification of health issues

#### Vaccination:

Vaccination of commercial poultry flocks is commonplace. However, vaccination of small flocks is relatively rare due to cost, availability, and a lack of planning. Vaccines are available through normal

veterinary supply chains. Unfortunately, most vaccines are only available in multi-dose packages to administer to large numbers of birds. Such packages usually need to be administered immediately upon opening. This will lead to a lot of waste in small flocks; however, the cost may still be accessible to owners of backyard poultry.

Vaccination should be on a risk-benefit analysis. Risk is calculated by multiplying the likelihood of an event happening by the severity of such an event. For vaccination of poultry, this can be summarised as:

Vaccinate when:

(Likelihood of adverse reactions x severity of adverse reactions) + cost of vaccine + cost of administration + potential production losses

is less than

(Likelihood of disease x severity of disease x value of bird) + (likelihood and severity of disease in humans).

The following vaccines are available in South Africa:

- *Avibacterium paragallinarum* (Coryza)
- *Mycoplasma gallisepticum*
- Newcastle disease (state-controlled disease)
- Reovirus
- Adenovirus (Egg drop syndrome)
- *Pasteurella multocida* (Fowl cholera)
- *Salmonella enteritidis*, *S. gallinarum* and *S. typhimurium* (state-controlled diseases)
- Infectious bronchitis
- Gumboro (Infectious Bursal Disease)
- Avian encephalomyelitis
- Fowl Pox
- Infectious laryngotracheitis
- Chicken anaemia virus
- Mareks disease
- Avian influenza (state-controlled disease)
- Coccidiosis
- Fowl herpes virus

#### Wing clipping:

Wing clipping is employed to prevent poultry birds from flying at heights and distances that would be sufficient for them to escape their range. Usually, wing clipping does not prevent all flight and poultry may still escape if the boundaries are inadequate. The need for wing clipping and the technique used varies between poultry species.

Animals should have the freedom to express normal behaviour, and this freedom may be reduced as a result of wing clipping. Where possible, outdoor enclosures should be designed so that birds with normal plumage are unable to escape.

In practice, wing clipping is often not needed in backyard chicken flocks and should therefore be performed based on need rather than as a routine procedure. It is achieved by clipping the outer primary feathers of one wing to the level of the end of the primary coverts (Figure 1). Whilst both wings can be clipped, a unilateral approach is more successful since it makes flight more unbalanced. Heavy-duty scissors work well.



**Figure 1**

**Parasite control:**

Poultry species are vulnerable to a range of endo- and ectoparasites. As with vaccination, preventative control measures for parasitic diseases must take into consideration the costs of treatment and the benefits of prevention.

**Nematodes:**

Flubendazole and fenbendazole are authorized for use in poultry.

**Coccidia:**

*Eimeria* spp. can be and are most devastating when naïve birds are exposed to a high infectious load. Whilst control of coccidiosis in a severe disease outbreak tends to focus on the use of anti-coccidial drugs, control of endemic coccidiosis is frequently based on coccidiostatic drugs. Coccidiostatic drugs, such as diclazuril, monensin and salinomycin are mixed into some feeds. Alternatively, vaccination can be considered. The use of coccidiostatic drugs and vaccination is rarely needed in backyard poultry flocks.

**Ectoparasites:**

Poultry often get mites and lice. Permethrin- and pyrethrum-based powders are usually applied directly to bedding and housing. Fipronil may be used directly on birds. Ivermectin and fluralaner are also used. Diatomaceous earth kills arthropods through desiccation and there is increasing evidence to support its use in poultry.

**References:**

Alwar D. 2023. *Personal communication.*  
 Govender K. 2023. *Personal communication.*  
 Mia M.Z. 2023. *Personal communication.*  
 Nkubungu Y. 2023. *Personal communication.*  
 Poland G., Raftery A. 2019. *Backyard poultry medicine and surgery.*  
 Smith et al. 2009. *Basic poultry production and management. UP course notes.*

Access your SAVA VetNews Article every month and complete the online assessment to receive your CPD points



**MANAGING YOUR CPD COMPLIANCE**

We understand that managing your CPD requirements can be a time consuming and somewhat frustrating process, which is why we want to introduce you to VetEDonline.

VetEDonline is an online CPD Management and Education Platform endorsed by the South African Veterinary Association (SAVA), which provide veterinarians with state of the art CPD Compliance and Education Solutions that assist them on their journey to CPD compliance.

VetEDonline supports practicing veterinarians with their CPD compliance by providing the following solutions and services:

- ONLINE COURSES**  
Online Courses from leading providers
- JOURNALS & ARTICLES**  
CPD accredited articles from SAVA
- ONLINE LEARNING PORTFOLIO**  
To manage your CPD certificates and keep track of your CPD points

Contact us for more information and guidance on your CPD compliance  
 +27 12 111 7000 | [support@veted.online](mailto:support@veted.online) | [www.veted.online](http://www.veted.online)

# MULTIPLE-CHOICE QUESTIONS

## QUESTION 1

**With regards to the plumage of birds:**

- a. It weighs the same as the skeleton.
- b. It weighs 2-3x less than the skeleton.
- c. It weighs 2-3x more than the skeleton.
- d. It weighs half that of the skeleton.
- e. It weighs a quarter of the skeleton.

## QUESTION 2

**Choose the correct answer with regard to moulting:**

- a. Birds usually moult their wing feathers first.
- b. Moulting is controlled by the pineal gland.
- c. Birds moult once the levels of oestrogen and androgen start to rise.
- d. The metabolic rate of a moulting bird has to increase by 15-25%.
- e. Roosters moult twice a year.

## QUESTION 3

**Which of the following bones are pneumatic and are involved in the respiratory system:**

- a. Humerus
- b. Skull
- c. Ulna
- d. Tibia
- e. Radius

## QUESTION 4

**Regarding the coelomic cavity:**

- a. The coelom contains six body cavities.
- b. There is a distinct thorax and abdomen.
- c. The diaphragm consists of 2 parts.
- d. Birds do not have a pericardium.
- e. There are 8 air sacs.

## QUESTION 5

**Birds have unique physiological and anatomical adaptations. Which one of the following statements is false?**

- a. The avian heart is 25-40% larger than mammals of a similar size.
- b. Avian lungs are 10 times more efficient than mammalian lungs in absorbing oxygen.
- c. Birds have a crop and gizzard instead of teeth.
- d. To facilitate weight reduction for flight, birds have no bladder or urethra.
- e. Birds are tetrachromatic and so have excellent colour vision.

## QUESTION 6

**Regarding the reproductive cycle in birds, which of the following is false?**

- a. The reproductive cycle of birds is controlled by the hypothalamus.
- b. Photoperiod plays an important role.
- c. Selective breeding has produced birds with short reproductive periods.

- d. Shortening daylight length causes gonad regression and allows time for moulting.
- e. Ovulation-oviposition takes approximately 25 hours in chickens.

## QUESTION 7

**Vaccinations are not commonplace in backyard flocks. Why is this?**

- a. Most vaccines are only available in multi-dose packages.
- b. Packages usually need to be administered immediately upon opening.
- c. Lack of knowledge about vaccines for poultry.
- d. High cost and wastage in small flocks.
- e. All of the above.

## QUESTION 8

**Regarding wing clipping in chickens, which of the following is correct:**

- a. Wing clipping is employed to prevent poultry birds from flying at heights and distances that would be sufficient for them to escape.
- b. Wing clipping does not prevent all flight and poultry may still escape.
- c. The need for wing clipping and the technique used varies between poultry species.
- d. Wing clipping is often not needed in backyard chicken flocks.
- e. All of the above.

## QUESTION 9

**Regarding Coccidia, which of the following is incorrect?**

- a. Coccidia is a significant cause of morbidity and mortality.
- b. Diclazuril, monensin and salinomycin are mixed into some feeds as coccidiostatic agents.
- c. Vaccinations are available.
- d. Vaccination is extremely important in backyard flocks.
- e. Coccidia is most devastating when naïve birds are exposed to a high infectious load.

## QUESTION 10

**Regarding ectoparasites in poultry, which of the following is incorrect?**

- a. Poultry do not get mites and lice.
- b. Permethrin is administered into the drinking water.
- c. Fipronil may not be used on birds.
- d. Diatomaceous earth kills arthropods by disrupting the normal function of the central nervous system.
- e. All of the above.

**SAVC CPD Accreditation Code:  
AC/1503/23**

**To answer the questions and obtain your  
CPD points for this article visit the  
Online On Demand Journals page on  
[www.veted.online](http://www.veted.online)**