

Unit A: Introduction to Poultry Science

Lesson 2: External Anatomy of Chickens

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Explain general information about chickens.
2. Identify the external anatomy parts of chickens.

Recommended Teaching Time: 2 hours

Recommended Resources: The following resources may be useful in teaching this lesson:

- A PowerPoint has also been developed for use with this lesson plan.
- <http://www.worldpoultry.net/>
- <http://www.fao.org/DOCREP/005/Y4628E/y4628e03.htm#TopOfPage>
- <http://www.poultrypages.com/>

List of Equipment, Tools, Supplies, and Facilities

Writing surface
PowerPoint Projector
PowerPoint Slides
Transparency Masters
Student Worksheets
Live Poultry - Hens and Roosters

Terms: The following terms are presented in this lesson (shown in bold italics and on PowerPoint Slide #2):

Back	Eye	Sickle feathers	Wattles
Beak	Face	Thigh	Wing Coverts
Body	Fluff	Saddle	Wing Secondaries
Breast	Nostril	Shank	Wing Primaries
Cape	Hackles	Spur	
Comb	Head	Tail Coverts	
Ear	Hock	Tail Feathers	
Ear lobe	Shoulder	Toe	

Interest Approach: Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask the students what they know about chickens. Write these facts about chickens on the board. Use this information to lead into a discussion of Objective one.

Summary of Content and Teaching Strategies

Objective 1: Explain general information about chickens.

(PowerPoint Slide #3)

- I. A chicken is a bird.
 - A. One of the features that differentiate it from most other birds is that it has a comb and two wattles.
 - 1. The comb is the red appendage on the top of the head, and the wattles are the two appendages under the chin.
 - 2. These are secondary sexual characteristics and are more prominent in the male.

(PowerPoint Slide #4)

- 3. The comb and wattles have a purpose. They serve as a cooling system.
 - a. Chickens do not sweat to provide cooling.
 - b. Instead, birds are cooled by blood that flows through the comb and wattles.
 - c. Warmer blood from the body flows into the comb and then returns to the interior parts of the body as it cools.

Use PowerPoint Slide #5 to explain to the students the difference between the comb and the wattles on the rooster and the hen. Use live birds to explain these two major characteristics if available.

(PowerPoint Slide #6)

- B. Chicken feathers provide insulation that helps to keep birds warm and protects the bird's skin from getting wet.
 - 1. When chicks hatch, they are covered with down.
 - a. Feathers begin to grow in a few days, covering the birds in four to six weeks.
 - b. Another feather growth begins at two to three months of age, and a final growth develops when birds become sexually mature.

(PowerPoint Slide #7)

- 2. Hens lose feathers (molt) naturally about once a year as part of their natural reproductive cycle.
 - a. Moulting takes place in a particular order.
 - i. Feathers are confined to definite tracts or areas of the body surface, with bare patches of skin between.
 - ii. The first plumage is lost from the head and neck, then from the saddle, breast and abdomen (body), then the wings and then from the tail.

(PowerPoint Slide #8)

- b. While the first feathers are being dropped from the neck and body, good layers will often keep laying, but when the wing feathers begin to drop, laying usually ceases.

(PowerPoint Slide #9)

- c. The main wing feathers consist of four tiny finger feathers on the extreme tip of the wing, the 10 large primary or 'flight' feathers, the small axial feather, and the 14 secondary feathers, which are smaller and softer than the primaries.
 - i. When the wing moults, primary feathers are shed first, from the axial outwards to the end of the wing, and then the secondaries, which are not shed in such a set order as the primaries.
 - ii. The number 1 primary feather is first to drop followed by a number 2 and then in order to number 10.
 - iii. While the primaries are being shed the secondaries begin to drop but not in any set order.

(PowerPoint Slide #10)

- d. The axial feather is dropped at the same time as the secondary next to it.
 - i. The new quill starts to grow as soon as the old feather is out and takes approximately six to seven weeks to grow.
 - ii. The moult is complete when all primary flight feathers on the wing are replaced.
 - iii. The feathers of the moulted bird are large and full, softer, cleaner, brighter and glossy in contrast to the feathers before moulting which were small and hard, dry, frayed and tattered.

Use PowerPoint Slide #11 to further explain the feather distribution on the parts of the wing diagram. TM: 2-1 can also be used to explain the feather distribution while you provide students a copy of WS: 2-1 to complete or draw a picture of the wing for their notes. Use actual live birds if they are available. Make sure students understand that no harm comes to the chicken when they are going through this natural process.

(PowerPoint Slide #12)

- e. Poultry breeders, however, have developed strains that can molt while continuing to lay eggs.
- f. Scientists have also discovered that control of lighting can prevent molting in laying hens.

(PowerPoint Slide #13)

- 3. Feather patterns and color are used along with skin and leg color, body shapes, combs and beaks to help identify breeds and varieties of chickens.
 - a. Neck and back feathers can also be used to determine the sex of adult chickens.
 - b. The feathers of males have pointed tips and are shinier than those found on females.
 - c. Female feathers have rounded ends.

Note the different feather patterns of the hen and rooster on PowerPoint Slide #14. Use live birds to also show these characteristics.

(PowerPoint Slide #15)

- C. The chicken has two legs and two wings, a fact that influences housing and management.
 - 1. Domestic chickens have essentially lost the ability to fly.
 - a. Heavy breeds used for meat production cannot do more than flap their wings and jump to a little higher level or move more rapidly along the ground.
 - b. The lighter-bodied birds can fly short distances, and some can fly over relatively high fences.

(PowerPoint Slide #16)

- 2. The feet and shank portions of the legs have scales and most chickens have three or four toes with claws used in scratching.

(PowerPoint Slide #17)

- D. Respiration rate is higher in chickens than in larger animals.
 - 1. In general, it can be said that the smaller the kind of bird the faster it breathes.
 - a. The male chicken breathes about 18 to 21 times a minute and the female about 31 to 37 times when they are not under stress.
 - 2. The heartbeat of chickens is rather fast, being about 286 times a minute in males and 312 in females in a resting condition.

(PowerPoint Slide #18)

- E. Digestion rate is somewhat rapid in chickens.
 - 1. It varies from 2 1/2 to 25 hours for passage of food depending on whether the digestion tract is full, partially full, or empty when feed is ingested.
- F. The chicken's temperature is about 41 degrees to 42 degrees C.
- G. Chickens are hatched, not born in the truest sense of the word.

(PowerPoint Slide #19)

- H. Chickens are covered with feathers but have a few vestigial hairs scattered over the body.
 - 1. The average consumer does not see these hairs, because they are singed off in the processing plant.
- I. The chicken has a beak (or bill) and does not have teeth.
 - 1. Any mastication occurs in the gizzard.
 - 2. Many commercial poultry producers do not provide grit to their chickens, because they feed a ground feed of fine meal consistency that can be digested by the bird's digestive juices.

(PowerPoint Slide #20)

- J. The chicken has pneumatic bones, making its body lighter for flying, if it had not lost the ability to do so.
- K. There are 13 air sacs in the chicken's body, again to make the body lighter, and they are a functioning part of the respiratory system.

(PowerPoint Slide #21)

- L. Chickens have comparatively short life spans.
 - 1. Some live to be 10 to 15 years old, but they are the exception, not the rule.
 - a. In commercial egg production, birds are about 18 months old when they are replaced by new, young stock.
 - b. It takes close to six months for a female chicken to mature sexually and start laying eggs.
 - c. They are kept for 12 to 14 months of egg production. After that their economic value declines rapidly, so they are disposed of when they are about 18 months old.

(PowerPoint Slide #22)

- M. Chickens have both white (breast) and dark (legs, thighs, back, and neck) meat.
1. The wings contain both light and dark fibers.

Objective 2: Identify External Anatomy of Chickens

(PowerPoint Slide #23)

- II. The anatomy of a chicken includes a study of both external and internal parts. Both can influence the way birds grow, reproduce and need to be managed.
- A. The following external parts help describe the chicken:
1. **Back.** The back is the dorsal part of the bird between the bases of the wings and from the neck to the tail. It is homologous to the human back.
 2. **Beak.** The hard, protruding portion of a bird's mouth, consisting of an upper beak and a lower beak.

(PowerPoint Slide #24)

3. **Body.** The body is homologous to the human torso. It is the bird's main mass not including its appendages such as wings, tails and legs. The body contains all essential organs and a large part of the bird's muscle mass.
4. **Breast.** The breast is the upper front part of a bird. Underneath the breast is where the major flight muscles are located which are then attached to the wings to help the bird lift its own weight. The muscles are attached to an enlarged breastplate which is a skeletal part unique to birds.
5. **Cape.** The narrow feathers between a chicken's neck and back.

(PowerPoint Slide #25)

6. **Comb.** The fleshy, usually red, crown on top of a chicken's head.
7. **Ear.** Responsible for maintaining equilibrium as well as sensing sound.
8. **Ear Lobe.** The soft, fleshy, pendulous lower part of the external ear.
9. **Eye.** An organ of vision or of light sensitivity.
10. **Face.** The face is homologous to the human face. It is the front part of the head consisting of the bill, eyes, cheeks and chin.
11. **Fluff.** The soft feathers of the chicken.

(PowerPoint Slide #26)

12. **Nostril.** External openings on the top of the beak and their function is to warm air on inhalation and remove moisture on exhalation.
13. **Hackles.** A rooster's cape feathers.
14. **Head.** The head is the upper part of the body, containing the bill, eyes, crown, ears and nose. It is homologous to the human head in terms of content and location.
15. **Hock.** A joint in the leg of a domestic fowl.
16. **Shoulder.** The shoulder refers to the relatively short feathers overlying the median secondary coverts on the top of the wing. They are located near the back and can be seen as the "first row" of feathers on the bird's wing. They are also called marginal coverts and lesser secondary coverts.

(PowerPoint Slide #27)

17. **Sickle Feathers.** Any long, curving feather, as in the tail of a rooster.
18. **Thigh.** The true femoral region that is hidden by the skin or feathers of the body.
19. **Saddle.** The part of a chicken's back just before the tail.
20. **Shank.** The part of a chicken's leg between the claw and the first joint.
21. **Spur.** A sharp horny growth on the leg of a chicken.
22. **Tail Coverts.** The tail coverts are the shorter tail feathers covering the bases of the long extending tail feathers.

(PowerPoint Slide #28)

23. **Tail Feathers.** The tail comprises of long feathers extending from the rear of the bird and is used for balance and as an asset to attract potential mates. Certain species have extremely elaborate tail feathers, such as peacocks, which serve no other purpose than to convey a positive message to a female during courtship.
24. **Toe.** The toes are digits attached to the feet just like human toes. Most birds have four toes. The first toe points backwards while the other three toes point forward. The second, third and fourth digits or toes are counted from the inside of the foot out and have 2, 3 and 4 phalanges respectively. Most birds do not have a fifth toe, except for some where it has evolved into a defensive spur, such as in the chicken.

(PowerPoint Slide #29)

25. **Wattles.** The two red or purplish flaps of flesh that dangle under a chicken's chin.
26. **Wing Coverts.** The primary coverts are shorter feathers that cover and protect the primary flight feathers. The secondary coverts are the feathers that cover and protect the secondaries, and are attached to the "elbow".
27. **Wing Secondaries.** The secondaries are flight feathers attached to the equivalent of the human elbow. They come behind the primaries in importance and location when viewed from the outermost edge of the wing.
28. **Wing Primaries.** The primaries are the flight feathers specialized for flight. They are attached to the "hand" equivalent part of the wing.

Use PowerPoint Slide #30 to show the external parts of the chicken. A live bird can also be used if available. Copies of TM: 2-2 can also be distributed to the students or WS: 2-2 can be completed by the students as each external body part is discussed. PowerPoint Slide #31 can be used as a review by the teacher pointing to a specific body part and asking the students to raise their hand if they can identify the body part.

Review/Summary: Use the student learning objectives to summarize the lesson. There are also Review Questions on PowerPoint Slide #32. Have students explain the content associated with each objective. Bring a couple of chickens to class or take the students outside to view a rooster and hen to discuss the different characteristics about chickens and to review their external anatomy.

Application: Application can involve the student activity in identifying external parts of live chickens and or completing WS 2-2.

Evaluation: Evaluation should focus on student achievement of this lesson's objectives. Use WS: 2-2 as an evaluation or ask the students to identify the external anatomy of the chicken. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1. G
2. F
3. C
4. D
5. A
6. H
7. I
8. B
9. E

Part Two: Completion

10. Beak
11. Wattles
12. Breast
13. Body
14. Spur
15. Fluff
16. Wing Primaries
17. Saddle
18. Back
19. Ear Lobe
20. Comb

Test

Lesson A-2: External Anatomy of Chickens

Part One: Matching

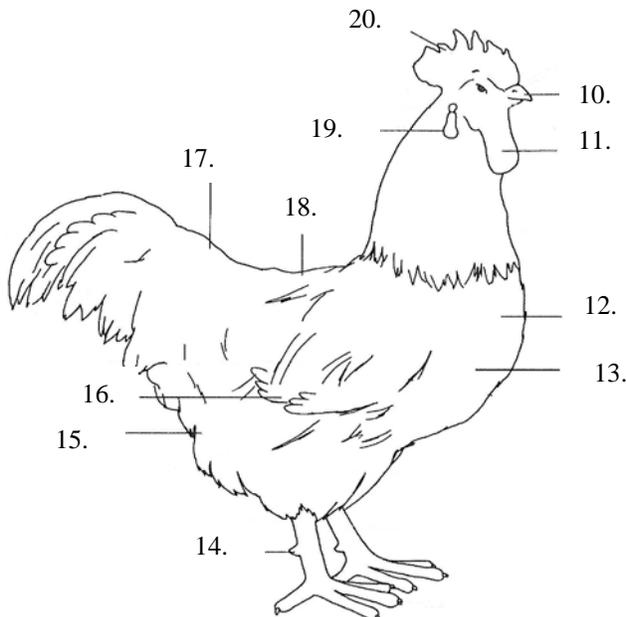
Instructions: Match the term with the correct response. Write the letter of the term by the definition.

- | | | |
|--------------------|-------------|-------------|
| a. Comb and Wattle | b. Feathers | c. Moulting |
| d. Rooster | e. Hen | f. Beak |
| g. Comb | h. Wattles | i. Spur |

- ___1. The fleshy, usually red crown on top of a chicken's head.
- ___2. Hard, protruding portion of a bird's mouth.
- ___3. Hens lose feathers as part of their natural reproductive cycle.
- ___4. Name given to a male chicken.
- ___5. Serve as a cooling system for the chicken.
- ___6. Two red or purplish flaps of flesh that dangle under a chicken's chin.
- ___7. A sharp horny growth on the leg of a chicken.
- ___8. Provide insulation and keep chicken dry.
- ___9. Name given to a female chicken.

Part Two: Fill in the Blank

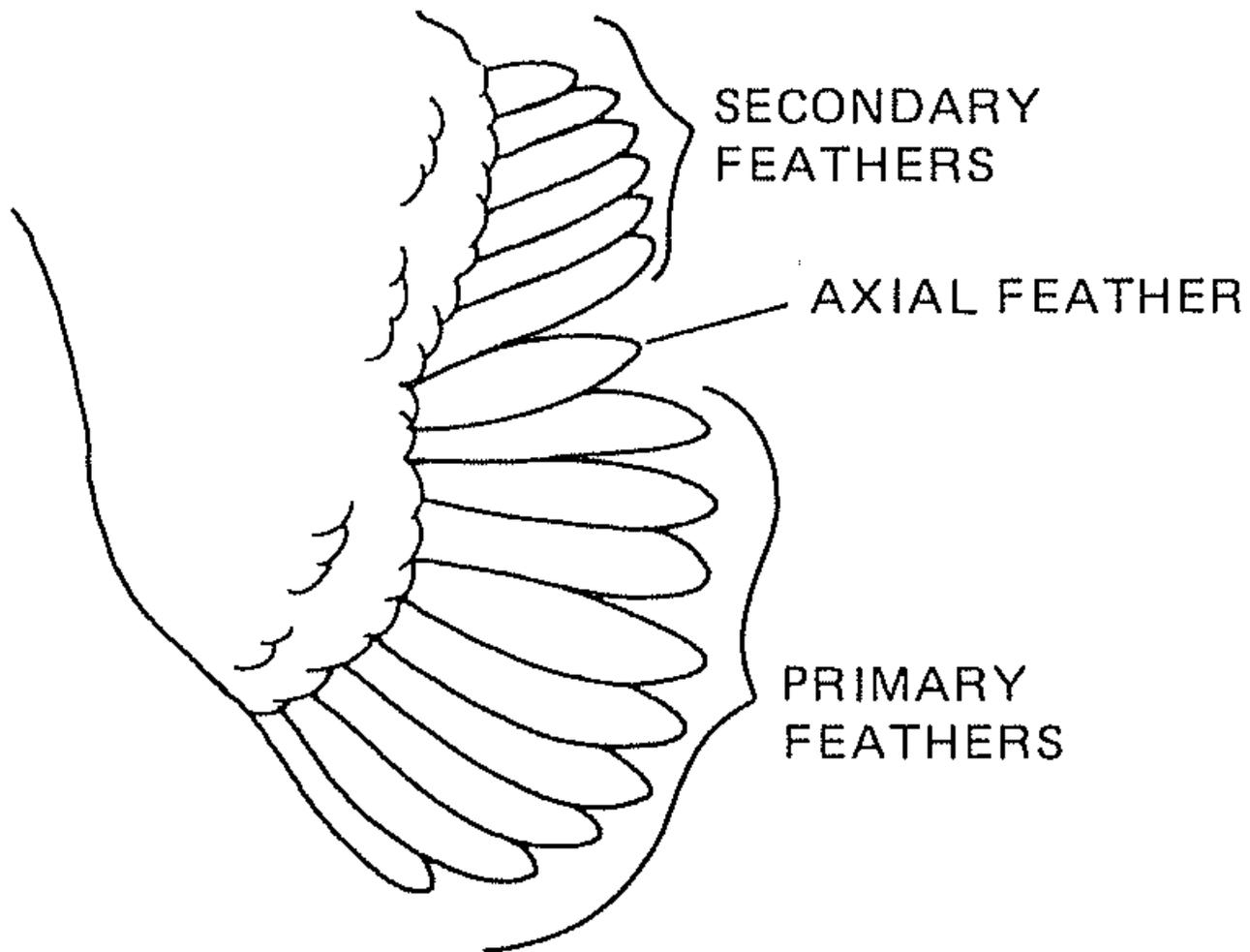
Instructions: Provide the word or words to correctly identify the external anatomy part of the chicken.



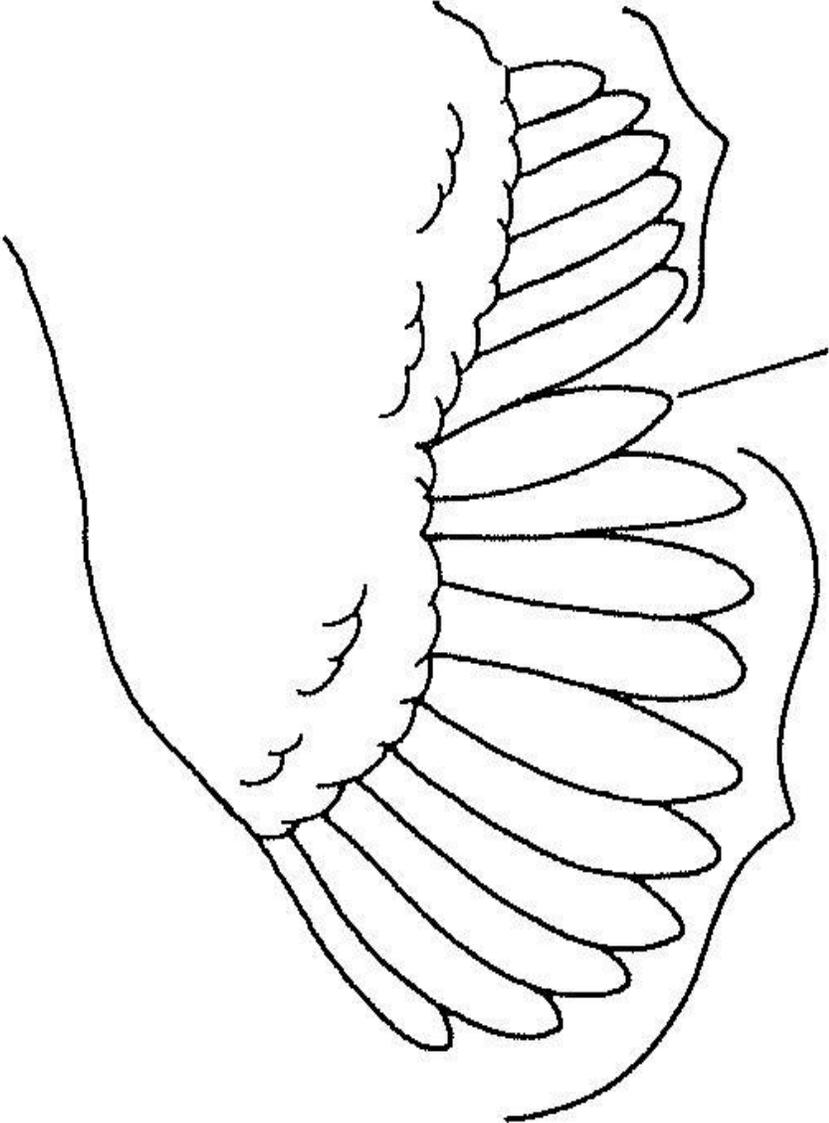
- 10. _____
- 11. _____
- 12. _____
- 13. _____
- 14. _____
- 15. _____
- 16. _____
- 17. _____
- 18. _____
- 19. _____
- 20. _____

TM: 2-1

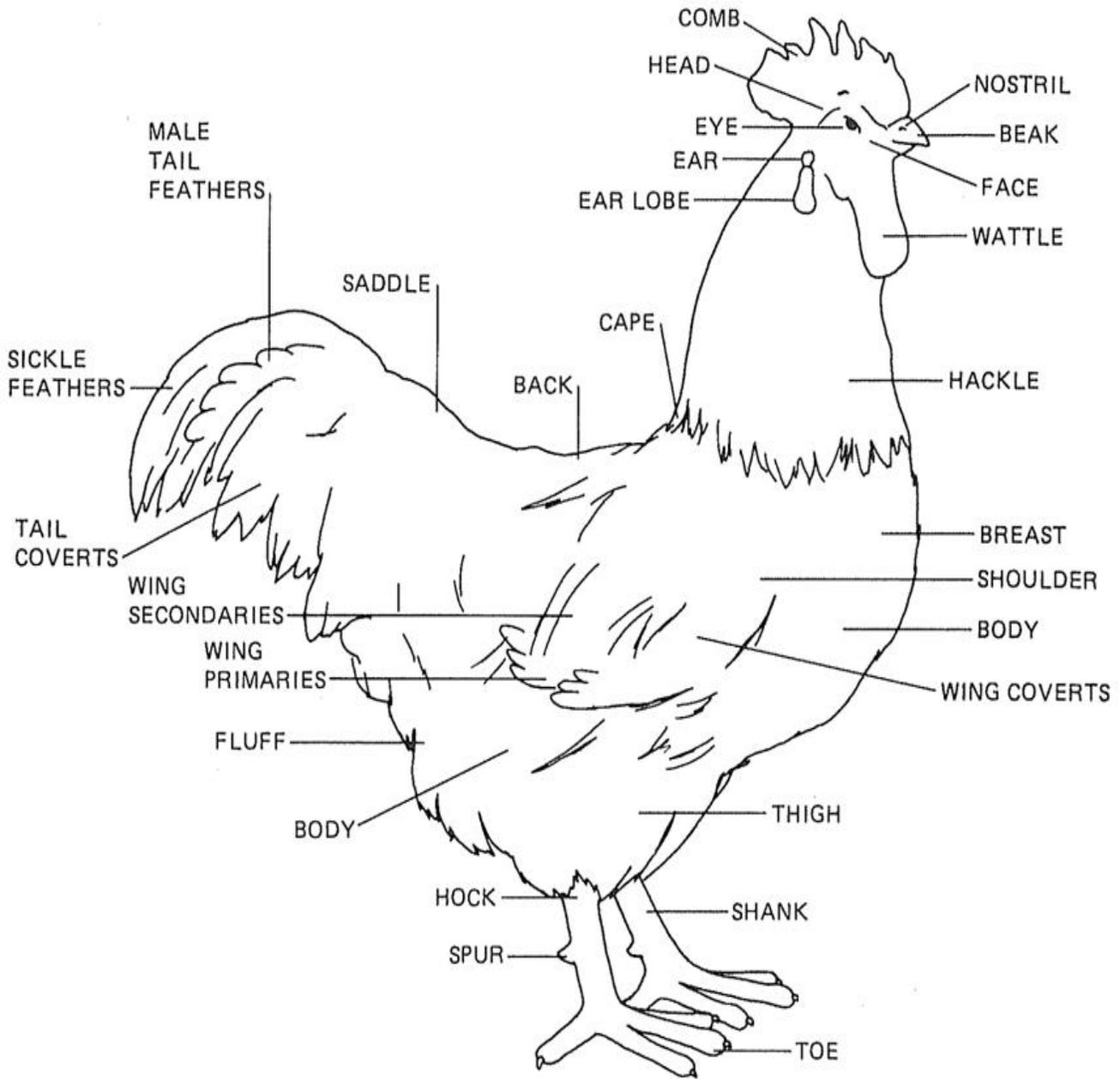
PARTS OF THE WING



PARTS OF THE WING

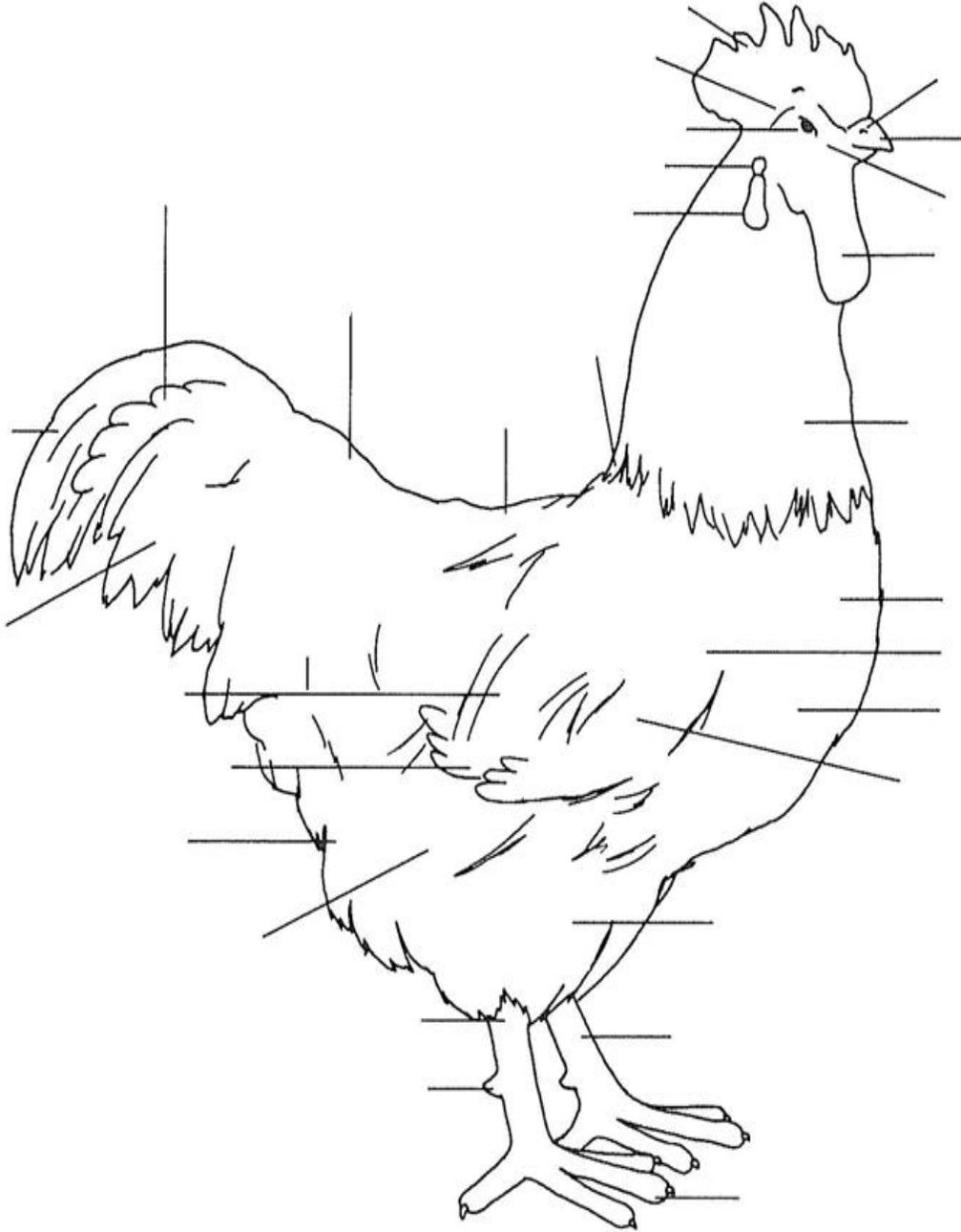


EXTERNAL PARTS OF A CHICKEN



WS: 2-2

EXTERNAL PARTS OF A CHICKEN



Definitions for Parts of a Chicken

- 1. Back.** The back is the dorsal part of the bird between the bases of the wings and from the neck to the tail. It is homologous to the human back.
- 2. Beak.** The hard, protruding portion of a bird's mouth, consisting of an upper beak and a lower beak.
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- 15.Hock.** A joint in the leg of a domestic fowl.

WS: 2-3 Continued

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