BONES OF THE TRUNK

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16TH SEPTEMBER 2019
VERTEBRAL COLUMN
(COLUMNA VERTEBRALIS)

- the vertebral column composed of the vertebrae
- the vertebrae form a horizontal chain
VERTEBRAL COLUMN
(COLUMNA VERTEBRALIS)

along the vertebral column three major curvatures are recognized:

1. the DORSAL CONVEX CURVATURE – between the head and the neck
2. the DORSAL CONCAVE CURVATURE – between the neck and the chest
3. the DORSAL CONVEX CURVATURE – between the thorax and the lumbar region

- in carnivores (Ca) there is an additional DORSAL CONVEXITY in the sacral region

https://hu.pinterest.com/pin/159877855502035893/
VERTEBRAL COLUMN
(COLUMNNA VERTEBRALIS)

- corresponding to the regions of the body, we distinguish:

1. CERVICAL VERTEBRAE
2. THORACIC VERTEBRAE
3. LUMBAR VERTEBRAE
4. SACRAL VERTEBRAE
5. CAUDAL (COCCYGEAL) VERTEBRAE
BUILD OF THE VERTEBRAE

each vertebrae presents:

1. **BODY (CORPUS VERTEBRAE)**
2. **ARCH (ARCUS VERTEBRAE)**
3. **PROCESSSES**
THE VERTEBRAL BODY (CORPUS VERTEBRAE)

- the ventral portion of the vertebra

ITS PARTS:

1. EXTREMITAS CRANIALIS (seu CAPUT VERTEBRAE) – convex
2. EXTREMITAS CAUDALIS (seu FOSSA VERTEBRAE) - concave
THE VERTEBRAL BODY (CORPUS VERTEBRAE)

3. VENTRAL SURFACE of the body has a:
- ventral crest (CRISTA VENTRALIS)

4. DORSAL SURFACE of the body carries:
- the vertebral arch (ARCUS VERTEBRAE)
THE VERTEBRAL BODY (CORPUS VERTEBRAE)

6. VERTEBRAL ARCH (ARCUS VERTEBRAE) composition:

a) a ventral PEDICULUS ARCUS VERTEBRAE

b) a dorsal LAMINA ARCUS VERTEBRAE

http://www.onemedicine.tuskegee.edu/CanineOsteology/Vertebral_column/C-atlas.html

https://viamedici.thieme.de/lernmodule/anatomie/wirbel+vertebrae?langtext=false

https://hu.pinterest.com/pin/73633860780330054/

https://www.slideshare.net/Kenhub_Anatomy/thoracic-lumbar-34616667

https://www.slideshare.net/Kenhub_Anatomy/thoracic-lumbar-34616667
6. VERTEBRAL ARCH (ARCUS VERTEBRAE) notched:

c. cranially – INCISURA VERTEBRALIS CRANIALIS

d. caudally – INCISURA VERTEBRALIS CAUDALIS

http://www.onemedicine.tuskegee.edu/Canine_Osteology/Vertebral_column/C-axis.html
THE VERTEBRAL BODY (CORPUS VERTEBRAE)

7. INTERVERTEBRAL FORAMEN (FORAMEN INTERVERTEBRALE) formed by:

1. INCISURA VERTEBRALIS CRANIALIS

2. INCISURA VERTEBRALIS CAUDALIS

- the notches of the adjacent vertebrae come together to form the intervertebral foramen
- the intervertebral foramen serves as an exit for the spinal nerves

https://opentextbc.ca/anatomyandphysiology/chapter/7-3-the-vertebral-column/
INCISURA VERTEBRALIS CAUDALIS

IN BOVINE:
- divided by a bony bridge
- called **foramen vertebrale laterale** also
THE VERTEBRAL BODY (CORPUS VERTEBRAE)

8. VERTEBRAL FORAMEN (FORAMEN VERTEBRALE) formed by:

a) the vertebral body
b) the vertebral arch
- situated centrally
THE VERTEBRAL BODY (CORPUS VERTEBRAE)

9. VERTEBRAL CANAL (CANALIS VERTEBRALIS) formed by:

a) the vertebral foramina of all vertebrae
   - lodges the spinal cord

INTERARCUATE SPACE (SPATIUM INTERARCUALE)

- between the vertebral arches
- clinical importance
- accessible for injection, punction

https://www.vetstream.com/treat/canis/illustration/epidural-dog-positioned-for-epidural-restraint-lateral-view
INTERARCUATE SPACE (SPATIUM INTERARCUALE)

A. ATLANTOOCCIPITAL SPACE (SPATIUM ATLANTOOCcipitale)
- between the occipital bone and the atlas

B. ATLANTOAXIAL SPACE (SPATIUM ATLANTOAXIALE)
- between atlas and axis

https://cavalierhealth.org/sm2.htm

INTERARCUATE SPACE (SPATIUM INTERARCUALE)

C. LUMBOSACRAL SPACE (SPATIUM LUMBOSACRALE)
- between the last lumbar and first sacral vertebra

Last lumbar vertebrae, Fe., dorsal aspect

D. Space between the last sacral vertebra and the first coccygeal vertebra

Sacrum of horse, dorsal aspect

Abb. 1-85. Kreuzbein eines Pferdes (Dorsalsicht).

Spatium interarcuale

Sacrum of horse, lateral aspect

Abb. 1-86. Kreuzbein eines Pferdes (Lateralsicht).
VERTEBRAL PROCESSES
(PROCESSUS VERTEBRALIS)

each vertebra has:

1. **one spinous process** (PROCESSUS (PROC.) SPINOSUS)
2. **two transverse processes** (PROC. TRANSVERSI)
3. **two pairs of cranial articular processes** (PROCC. ARTICULARES (Zygopophyses) CRANIALES)
4. **two pairs of caudal articular processes** (PROCC. ARTICULARES (Zygopophyses) CAUDALES)

Cervical vertebrae, Ca., dorsal aspect
5. mamillary processes (PROCC. MAMILLARES):
- on the thoracic and lumbar vertebrae
- situated between the cranial articular and the transverse process

Canine: Thoracic Vertebrae
1. Spinous process
2. Caudal articular process
3. Transverse process with costal fovea
4. Mamillary process
5. Caudal vertebral notch
6. Costal foveae
7. Body

Note: Left, lateral view.
VERTEBRAL PROCESSES
(PROCESSUS VERTEBRALIS)

6. accessory processes (PROCC. ACCESSORI) :
- on the thoracic and lumbar vertebrae in carnivore
- situated between the caudal articular and the transverse process

Thoracal vertebra, Ca, caudal aspect
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

- all mammalian species possess seven (C1 – C7) cervical vertebrae
- the 1st and the 2nd cervical vertebrae facilitate free movement of the head

Cervical vertebrae, Ca., dorsal aspect

http://vanat.cvm.umn.edu/ungDissect/Lab08/Img8-2.html
1st CERVICAL VERTEBRA (ATLAS, C1):

- „carrier of the head”

composed of:

1. NO CORPUS
2. dorsal arch (ARCUS DORSALIS)
3. ventral arch (ARCUS VENTRALIS)
4. MASSA LATERALIS
5. ALA ATLANTIS (wing)
6. VENTRAL SURFACE of the wing
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1):

VENTRAL ARCH (ARCUS VENTRALIS):

a) carries the TUBERCULUM VENTRALE

b) its internal surface bears the FOVEA DENTIS – for articulation with the dens axis
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1)

DORSAL ARCH (ARCUS DORSALIS):
- carries the TUBERCULUM DORSALE – modified spinous process
CERVICAL VERTEBRAE  
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1):

FOSSA ATLANTIS (ATLANTAL FOSSA):

- the VENTRAL SURFACE of the wing is excavated to form the FOSSA ATLANTIS

Fig. 2: Ventral view of Atlas of adult male Blue bull (Boselaphus tragocamelus) showing 
(a) Anterior articular cavity, (b) Foramen in fossa atlantis, (c) Fossa atlantis,
(d) Wing and (e) Articular surface of ventral arch and (f) Vental tubercle

https://www.semanticscholar.org/paper/Gross-Anatomical-and-Sex-wise-Biometrical-Studies-(Sathapathy-Dhote/af69f9abbed30ec55ff11c75761f94142c8238c2/figure/1
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1):

FORAMEN ALARE:

- in Eq, Bo, Su
- the root of the ala atlantis is pierced by the foramen alare
- the foramen alare leads into the atlantal fossa

C1, Bo., dorsal aspect

C1, Eq., dorsal aspect
1st CERVICAL VERTEBRA (ATLAS, C1):

in Carnivores:

- **ALAR NOTCH (INCISURA ALARIS)**
CERVICAL VERTEBRAE  
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1):

TRANSVERSE FORAMEN (FORAMEN TRANSVERSARIIUM):

- the wing is perforated caudally by the transverse foramen
  - in Ca, Eq
  - except in ruminants
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1):

LATERAL VERTEBRAL FORMAMEN (FORAMEN VERTEBRALE LATERALE):
- medial exit of the vertebral canal from the alar foramen
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1):
- the articular processes are absent

1. the cranial articular surfaces are represented by the:
   a. FOVEAE ARTICULARES CRANIALES
- articulate with the occipital condyles

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Fig. 2: Ventral view of Atlas of adult male Blue bull (Boselaphus tragocamelus) showing (a) Anterior articular cavity, (b) Foramen in fossa atlantis, (c) Fossa atlantis, (d) Wing and (e) Articular surface of ventral arch and (f) Ventral tubercle

https://www.semanticscholar.org/paper/Gross-Anatomical-and-Sex-wise-Biometrical-Studies-(Sathapathy-Dhote/a6f9f9abbed30ec55ff11c75761f94142c8238c2/figure/1

http://www.onemedicine.tuskegee.edu/CanineOsteology/Vertebral_column/C-atlas.html
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

1st CERVICAL VERTEBRA (ATLAS, C1):

1. the caudal articular surfaces are represented by the:

a. FOVEAE ARTICULARES CAUDALES

- articulate with the processes of the axis

Fig. 4: Caudal view of Atlas of adult male Blue bull (Boselaphus tragocamelus) showing (a) Ventral tubercle, (b) Wing, (c) Caudal articular surface, (d) Floor of neural canal, (e) Fovea dentis and (f) Cervical vertebral foramen

https://www.semanticscholar.org/paper/Gross-Anatomical-and-Sex-wise-Biometrical-Studies-(Sathapathy-Dhote/af69f9abbed30ec55ff11c75761f94142c8238c2/figure/3
2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

1. long body
2. prominent crista ventralis
3. DENS AXIS – tooth – like process
2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

4. PROC. SPINOSUS

IN CARNIVORES:

– extends cranially and caudally
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

4. PROC. SPINOSUS

IN SMALL RUMINANTS, IN THE OX:

– its shape rectangular with a convex dorsal border

![Diagram of Cervical Vertebra](image)
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):
4. PROC. SPINOSUS
IN HORSE
– continued caudally to the articular processes by two ridges

2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

5. PROC. TRANSVERSUS:

- poorly developed with only a caudal process
2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

6. FORAMEN TRANSVERSARIIUM

- perforates the wing of the transverse process
2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

7. PROC. ARTICULARIS CRANIALIS - Facies art. cran.

8. PROC. ARTICULARIS CAUDALIS – Facies art. caud.
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

7. FACIES ARTICULARIS CRANIALIS – in Eq. divided

8. FACIES ARTICULARIS CAUDALIS

https://pdfs.semanticscholar.org/af69/f9abbed30ec55ff11c75761f94142c8238c2.pdf
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

IN CARNIVORES:
- INCISURA VERTEBRALIS CRANIALIS
- INCISURA VERTEBRALIS CAUDALIS

C2 (Axis), Ca.
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

2nd CERVICAL VERTEBRA (AXIS, EPISTROPHEUS, C2):

IN Eq, Bo, Su:
- FORAMEN VERTEBRALE LATERALE
- Incisura vertebralis caudalis
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

3rd - 7th CERVICAL VERTEBRAE (C3 – C7):

CORPUS VERTEBRAE:
- diminish in length towards the thorax
- the bodies of the 3rd – 7th vertebrae carry a prominent crista ventralis
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

3rd - 7th CERVICAL VERTEBRAE (C3 – C7):

PROCESSUS SPINOSUS:

In Eq:
- rudimentary

CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

3rd - 7th CERVICAL VERTEBRAE (C3 – C7):

PROCESSUS SPINOSUS:

In the other animals:

- gradually increase in length from cranial to caudal
CERVICAL VERTEBRAE  
(VERTEBRAE CERVICALES)

3rd - 7th CERVICAL VERTEBRAE (C3 – C7):

PROCESSUS TRANSVERSUS:
- distinct
- each comprises a ventral and a dorsal part – except the C7
- perforated at their roots by the transverse foramen
- transverse process of C7 – has no transverse foramen
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

PROCESSUS TRANSVERSUS of 6th CERVICAL VERTEBRA:
- modified into a plate – like projection – LAMINA VENTRALIS (VENTRAL PLATE)

http://www.onemedicine.tuskegee.edu/CanineOsteology/Vertebral_column/C-6.html
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

TRANSVERSE FORAMINA:
- of all cervical vertebrae (exexcept C7) form the TRANSVERSE CANAL (CANALIS TRANSVERS AIRUS)
- the transverse canal houses the vertebral artery (arteria verteb ralis)

[Diagram of vertebral arteries and vertebrae]  
[https://veteriankey.com/cervical-spine/]
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

3nd - 7th CERVICAL VERTEBRAE (C3 – C7):

PROCESSUS ARTICULARIS CRANIALIS ET CAUDALIS:

- large
- their articular surfaces (Facies articularis carnialis et caudalis) are in horizontal plane – allows free lateral movement of the neck
CERVICAL VERTEBRAE (VERTEBRAE CERVICALES)

3nd - 7th CERVICAL VERTEBRAE (C3 – C7):

INCISURA VERTEBRALIS CRANIALIS ET CAUDALIS:

- deep

http://www.onemedicine.tuskegee.edu/CanineOsteology/Vertebral_column/C-6.html
CERVICAL VERTEBRAE
(VERTEBRAE CERVICALES)

7th CERVICAL VERTEBRAE (C7):

1. the body is short

2. caudodorsally has a FOVEA COSTALIS CAUDALIS – articular surface for the head of the 1st rib with the cranial fovea of the 1st thoracic vertebra

3. spinous process is high

4. transverse process represented by their dorsal parts and dorsal tuberosities

5. the transverse foramen is absent
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

a) the thoracic vertebrae
b) the paired ribs
c) the sternum form the bony boundaries of the thoracic cavity

Skeleton of the thorax, Fe, lateral aspect
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

THE NUMBER OF THE THORACIC VERTEBRAE:

1. in Ca, Bo – 13
2. in Pigs – 14 or 15
3. in Eq 18

https://www.horsetalk.co.nz/2016/03/21/saddle-horse-pain-equine-symptomatic-lameness/
https://www.slideshare.net/AsadAbdulHannan/comparative-study-of-vertebral-column-of-camel-ox-and-horse
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

THE BODY (Corpus vertebrae):

- shorter
- caudal thoracic vertebrae present small ventral crest
- FOVEA COSTALIS CRANIALIS ET CAUDALIS – articulate with the heads of the ribs
- the last thoracic vertebra has no Fovea costalis caudalis
THORACIC VERTEBRAE
(VERTEBRAE THORACICAET)

PROCESSUS SPINOSUS:

1. of the more cranial thoracic vertebrae are well developed
   - In Car – gradually reduced in size
   - In Bo – increases in length to the 3rd vertebra
   - In Eq – increases in length to the 4th or 5th vertebra
   - thereafter they gradually diminish in Bo and Eq to the 12th or 13rd thoracic vertebrae
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

PROCESSUS SPINOSUS:

WITHERS:

- the region in which the thoracic vertebrae have especially tall spines

[Image of horse skeleton with labeled vertebrae]
[Image of horse with Withers highlighted]

https://hu.pinterest.com/pin/334603447291668587/


http://vanat.cvm.umn.edu/un

gDissect/Lab09/Img9-1.html

https://heritagejersey.org/measuring.aspx
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

PROCESSUS SPINOSUS:

VERTEBRA ANTICLINALES:
- the cranial spinous processes are inclined caudally - they gradually become more upright until those of the last thoracic vertebrae like those of the lumbar region – they almost vertical
- thoracic vertebrae with vertical spines are termed VERETBRAE ANTICLINALES
- Vertebrae anticlinales include the last 3 to 4 thoracic vertebra
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

TRANSVERSE PROCESS:
- short

1. FOVEA COSTALIS PROCESSUS TRANSVERSI (TRANSVERSE COSTAL FOVEAE):
- tubercules of the ribs articulate with the transverse costal fovea

[Images of anatomical structures labeled with Latin terms such as Fovea costalis cranialis, Facies articularis, Processus spinosus, etc.]

https://veteriankey.com/canine-anatomy/
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

CRANIAL AND CAUDAL ARTICULAR PROCESSES:
- the cranial articular process fused with the mamillary process

MAMILLARY PROCESSES:
- directed cranially
- the cranial articular process fused with the mamillary process – **PROC. MAMILLOARTICULARES**
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

ACCESSORY PROCESSES:
- in Carnivores - on the last thoracic vertebrae

Th13, Ca., lateral aspect
THORACIC VERTEBRAE
(VERTEBRAE THORACICAE)

INCISURA VERTEBRALIS CRANIALIS:
- shallow

INCISURA VERTEBRALIS CAUDALIS:
- deeper
- in ox – a bony ridge divides the lateral vertebral foramen into two
LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

THE NUMBER OF THE LUMBAR VERTEBRAE:
1. in carnivores – 7
2. in pigs, ruminants, horses - 6
LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

THE VERTEBRAL BODY:
- larger longer
- the cranial and caudal extermitites flat
- vertebral arches – well developed

L1 vertebra from a craniolateral view (C), and L5 vertebra from a caudolateral view (D).

http://www.onemedicine.tuskegee.edu/CanineOsteology/Vertebral_column/L4.html
https://veteriankey.com/canine-anatomy/
LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

PROCESSUS SPINOSUS:
- in carnivores the length increases in height up to the 5th or 6th vertebrae
- in Eq. long and slender
- in Bo. short

https://www.slideshare.net/humanupgrade/skeletal-system-of-bovine


https://eclectic-horseman.com/cp10-3b/
LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

PROCESSUS TRANSVERSUS (Proc. costalis, costal process):
- represent rudimentary ribs – Proc. costalis
- extend laterally
- in carnivores directed downwards and forwards
- in ruminants directed horizontally, at the end bended, longer than in Eq.
- In horses directed horizontally
LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

PROCESSUS TRANSVERSUS:

In HORSE:

- the transverse processes of the last two vertebrae (L5-L6) articulate with each other – there are articular surfaces on them

- the transverse processes of the last vertebra articulate with the wing of the sacrum


LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

PROCESSUS ARTICULARIS:
- the articular surface is sagittal
- the cranial articular process fused with the mamillary processes
LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

PROCESSUS ACCESSORIUS:
- only in carnivores
- projects caudally

L1 vertebra from a craniolateral view (C), and L5 vertebra from a caudolateral view (D).

https://veteriankey.com/canine-anatomy/
LUMBAR VERTEBRAE
(VERTEBRAE LUMBALES)

INCISURA VERTEBRALIS CRANIALIS:
- less deep

INCISURA VERTEBRALIS CAUDALIS:
- In ox the in the first 3 lumbar vertebrae converted into foramen by a ridge of bone – the lateral vertebral foramen divided
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

- the sacral region is completely immobile
- OS SACRUM (SACRUM, SACRAL BONE) formed by the fusion of the sacral vertebrae
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

THE NUMBER OF THE SACRAL VERTEBRAE:

1. in carnivores – 3
2. in pigs – 4
3. in goat, ox, horse - 5
4. in sheep - 4
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

SHAPE OF OS SACRUM (SACRUM, SACRAL BONE):

1. in carnivores – rectangular
2. in other species - triangular
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

1. BASIS OSSIS SACRI
   - directed cranially

2. APEX OSSIS SACRI:
   - smaller
   - lies caudally
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

3. FACIES PELVINA:
- fusion of the vertebral bodies – recognized as LINEA TRANSVERSAE
- the ventral crest absent
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

4. EXTREMITAS CRANIALIS:
- only on the 1st sacral vertebra

5. EXTREMITAS CAUDALIS:
- only on the last sacral vertebra
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

6. INCISURA VERTEBRALIS CRANIALIS:
- only on the 1st sacral vertebra

7. INCISURA VERTEBRALIS CAUDALIS:
- only on the last sacral vertebra

Sacrum, Ca., dorsal aspect
PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

8. PROMOTORIUM:
- the ventral rim of the 1st sacral vertebral body
- projects forwards and downwards
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

9. SACRAL CANAL (CANALIS SACRALIS):
- the vertebral arches of the dorsal surfaces fused

Sacrum, Ca., dorsal aspect

https://rutupic.pw/l7-vertebrae-dog.html
PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

10. PROCESSUS SPINOSUS on FACIES DORSALIS

- directed caudally
- in ox, in older horses fused along their entire length to form the CRISTA SACRALIS MEDIANA
PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

10. PROCESSUS SPINOSUS on FACIES DORSALIS

- in carnivores, horses – only the base of the processes are fused, the dorsal parts remain separate, expanded into tuberosities (Tuberositas processi spinosi)
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

11. PARS LATERALIS:
- formed by the fused transverse processes

-12. CRISTA SACRALIS LATERALIS (lateral sacral crest)
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):
13. ALAE SACRALES (SACRAL WINGS):
- formed by the transverse processes of the 1st sacral vertebra

https://veteriankey.com/canine-anatomy/
13. ALAE SACRALES (SACRAL WINGS):

a. FACIES AURICULARIS (AURICULAR SURFACE):
   - covered with cartilage
   - articulates with similar surface of the wing of the ilium
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

14. PROCESSUS ARTICULARIS CRANIALIS
- on the 1st sacral vertebra

15. PROCESSUS ARTICULARIS CAUDALIS:
- on the last sacral vertebra
SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

IN OX:

CRISTA SACRALIS INTERMEDIA:

- formed by the rudimentary, fused articular processes

SACRAL VERTEBRAE
(VERTEBRAE SACRALES)

PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

16. FORAMINA SACRALIA VENTRALIA:

- pelvic sacral foramen

- on the facies pelvina

- ventral opening of the sacral canal

http://www.onemedicine.tuskegee.edu/CanineOsteology/Vertebral_column/sacrum.html
PARTS OF OS SACRUM (SACRUM, SACRAL BONE):

16. FORAMINA SACRALIA DORSALIA:
- dorsal sacral foramen
- on the facies dorsalis
- dorsal opening of the sacral canal
CAUDAL (COCCYGEAL) VERTEBRAE
(VERTEBRAE CAUDALES)

THE NUMBER OF THE CAUDAL VERTEBRAE:
1. In carnivores, in pigs 20 – 23
2. In sheep 3 – 24
3. In goats 12 – 16
4. In cattle 18 – 20
5. In horses 15 - 21

https://hu.pinterest.com/pin/159877855502035893/
https://www.slideshare.net/AsadAbdulHannan/compare-study-of-vertebral-column-of-camel-ox-and-horse
CAUDAL (COCCYGEAL) VERTEBRAE
(VERTEBRAE CAUDALES)

In carnivores, cattles:

1. PROCESSUS HEAMALES

2. ARCUS HAEMALIS – fusion of the procc. heamales

Cd4 vertebra from a cranial view (C), and Cd6 vertebra from a dorsal view (D). (From Evans HE: Miller’s anatomy of the dog, ed 4, Philadelphia, 2013, WB Saunders.)

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SKELETON THORACIS

formed by the:

a) thoracis vertebrae dorsally
b) ribs, costal cartilages laterally
c) sternum ventrally
THORAX

- laterally compressed cone forms:

1. the wall of the thoracic cavity
   a. anterior opening (APERTURA THORACIS CRANIALIS)
   b. posterior opening (APERTURA THORACIS CAUDALIS)

LATERAL SURFACE:

- provides large areas for the attachment of the supporting forelimb
SKELETON THORACIS

STERNUM:
- median, segmental bone

SEGMENTS or STERNEBRAE:
- united by cartilages forming the synchondroses sternales
SKELETON THORACIS

PARTS OF THE STERNUM:

1. MANUBRIUM STERNI (PRESTERNUM):
   - cranial extremity
   - articulation surface for the 1st pair of ribs

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Sternum, Eq., ventral aspect

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Sternum, Fe., dorsal aspect
PARTS OF THE STERNUM:

2. CORPUS STERNI (MESOSTERNUM):
- the manubrium sterni articulates with the corpus consists of:
  a) in carnivores 6 sternal bones or sternebrae
  b) in ruminants and horses 5 sternal bones or sternebrae
  c) in pigs 4 sternal bones or sternebrae
SKELETON THORACIS

PARTS OF THE STERNUM:

2. CORPUS STERNI (MESOSTERNUM):
   a. in carnivores – rectangular shaped
   b. in ruminants – dorsoventrally falttened
SKELETON THORACIS

PARTS OF THE STERNUM:

2. CORPUS STERNI (MESOSTERNUM):

a. in horses - at the level of the 1st sternebra the sternum assumes the shape of a ship’s keel (CRISTA STERNALIS), dorsoventrally flattened
SKELETON THORACIS

PARTS OF THE STERNUM:

2. CORPUS STERNI (MESOSTERNUM):

- INCISURAE COSTALES (costal notches) – articulation with the cartilages of the sternal ribs

https://veteriankey.com/canine-anatomy/

https://www.sciencedirect.com/topics/veterinary-science-and-veterinary-medicine/sternum
SKELETON THORACIS

PARTS OF THE STERNUM:

3. PROCESSUS XIPHOIDEUS (XIPHOSTERNUM):

- caudal portion
- midline continuation of the sternum
- not connected with the ribs
- bears the xiphoid cartilage (Cartilago xiphoidea) – projects between the two costal arches (Regio xiphoidea)
- the bony xiphoid process absent in horse

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SKELETON THORACIS

RIBS (COSTAE):
- in the thoracic region remain well developed

Comparative thoracic osteology. The horse has more ribs but they are thinner. The last rib (1) is shorter in the horse but the 13th rib of the horse (2) is similar in length to the bovine 13th rib (1). The costal arch (3) is much longer and more slanted in the horse. The bovine thorax is deeper than that of the horse and therefore the bovine sternum (5) is ventral to the olecranon (4). The cranial part of the bovine sternum forms the brisket (6).

http://vanat.cvm.umn.edu/ungDissect/Lab09/Img9-1.html
SKELETON THORACIS

RIBS (COSTAE):

- the number of the ribs corresponds to the number of the thoracic vertebrae
  a. in carnivores, ruminants 13
  b. in pigs 14 – 15
  c. in horses 18

https://www.amazon.co.jp/ANIMALS-SKELETON-ANATOMY-POSTER-%E5%8B%95%E7%89%A9%E3%81%86%E3%81%BE%E3%82%A2%E3%83%BC%E3%83%88%E3%83%AA%E3%83%B3%E3%83%88%E3%82%B9%E3%82%BF%E3%83%BC/dp/B01MTIFNZR

https://canineanatomyforbeginners.wordpress.com/skeletal-system/

https://hu.pinterest.com/pin/122160208625934287/
SKELETON THORACIS

RIBS (COSTAE):
- forms the lateral wall of the thorax

INTERCOSTAL SPACES (SPATIA INTERCOSTALIA)
- spaces between the ribs

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SKELETON THORACIS

EACH RIB is divided into:

1. a bony portion – OS COSTALE
   - situated proximally
2. a cartilaginous portion – CARTILAGO COSTALIS
   - situated dorsally
SKELETON THORACIS

COSTAE VERAE seu STERNALES (true, direct ribs):

- the cranial ribs conjoined directly by their cartilages with the sternum
- called as „bearing ribs” - suspend the trunk
SKELETON THORACIS

COSTAE SPURIAE seu ASTERNALES (false, asternal, indirect ribs):

- the remainder ribs do not form a direct junction with the sternum
- called as „respiratory ribs“- highly mobile allowing the free movement of the thorax during respiration

https://pdfs.semanticscholar.org/dbbc/1f29438b5cabd11c6b37d6fd410d6480d547.pdf
http://vanat.cvm.umn.edu/ungDissect/Lab09/Img9-1.html
SKELETON THORACIS

COSTAE SPURIAE seu ASTERNALES (false, asternal, indirect ribs):

- their cartilages unite with one onether to form the COSTAL ARCH (ARCUS COSTALIS)

Comparative thoracic osteology. The horse has more ribs but they are thinner. The last rib is shorter in the horse but the 13th rib of the horse (2) is similar in length to the bovine. The costal arch (3) is much longer and more slanted in the horse. The bovine thorax is that of the horse and therefore the bovine sternum (5) is ventral to the olecranon (4). Part of the bovine sternum forms the brisket (6).

http://vanat.cvm.umn.edu/ungDissect/Lab09/Img9-1.html
SKELETON THORACIS

COSTAE FLUCTUANTES (floating ribs):
- ribs their ends are free
- the free ends do not attached to the adjacent cartilage
- the last pair of ribs in dog

Skeleton of the thorax, Fe, lateral aspect
SKELETON THORACIS

PARTS OF THE BONY PORTION OF THE RIBS (OS COSTALE):

I. ON THE EXTREMITAS VERTEBRALIS (VERTEBRAL EXTREMITY):

1. HEAD (CAPUT COSTAE)
   a. SULCUS seu CRISTAE CAPITIS COSTAE
   b. FACIES ARTICULARIS CAPITIS COSTAE CRANIALIS
   c. FACIES ARTICULARIS CAPITIS COSTAE CAUDALIS

https://hu.pinterest.com/pin/841891724064635947/
SKELETON THORACIS

PARTS OF THE BONY PORTION (OS COSTALE):

2. COLLUM COSTAE
   - lies distally

3. TUBERCULUM COSTAE
   - protrudes laterally
   - - FACIES ARTICULARIS TUBERCULI COSTAE

http://vanat.cvm.umn.edu/ungDissect/Lab09/Img9-3.html
4. **ANGULUS COSTAE (ANGLE):**

- distal to the costal tubercle
- intervening portion of the CORPUS COSTAE
SKELETON THORACIS

PARTS OF THE BONY PORTION (OS COSTALE):

5. TUBEROSITAS MUSCULI SCALENI VENTRALIS:
   - on the 1st rib
   - except ruminants

6. TUBEROSITAS MUSCULI LONGISSIMI:
   - located at the level of the angle

7. TUBEROSITAS MUSCULI ILIOCOSTALIS:
   - on the caudolateral border

https://www.tankonyvtar.hu/hu/tartalom/tkt/haziallatok/ch02.html
SKELETON THORACIS

PARTS OF THE BONY PORTION (OS COSTALE):

8. SULCUS COSTAE:
- on the medial surface
- intercostal vessels and nerves

https://hu.pinterest.com/pin/841891724064635947/
SKELETON THORACIS

PARTS OF THE BONY PORTION (OS COSTALE):

II. ON THE EXTREMITAS STERNALIS (STERNAL EXTREMITY):

a. COSTOCHONDRAL JUNCTION

- between the distal part of the bony portion and the costal cartilage
SKELETON THORACIS

PARTS OF THE BONY PORTION (OS COSTALE):

II. ON THE EXTREMITAS STERNALIS (STERNAL EXTREMITY):

1. GENU COSTAE (KNEE):

- the angulation of the rib with the costal cartilage
- in the dog formed by the costal cartilage
- in other animals accures at the costochondral junction

https://www.tankonyvtar.hu/hu/tartalom/tkt/haziallatok/ch02.html
SKELETON THORACIS

COSTAL CARTILAGE (CARTILAGO COSTALIS):
- articulates with the sternum
a) the 1st pair of ribs articulate with the manubrium sterni
b) the subsequent sternal ribs (except for the last pair) from joints – which are situated between the adjacent sternal segments
SKELETON THORACIS

COSTAL CARTILAGE (CARTILAGO COSTALIS):
c. cartilage of the asteinal ribs longer – form the costal arch

ANGULUS ARCUUM COSTALIUM:
- formed by both costal arches ventrally
- inserted into the xiphoid process

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THANK YOU FOR YOUR ATTENTION!
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