RADIOGRAPHIC EXAMINATION FOR THE CLASSIFICATION IN THE KWPN BREEDING PROGRAM 2024

NAVICULAR BONE
PROXIMAL SESAMOID BONES
FETLOCK JOINT (FRONT LEG/HIND LEG)
HOCK / TARSAL JOINT
STIFLE JOINT
CERVICAL SPINE
SPINAL PROCESSUS OF THE THORACOLUMBAR SPINE

REQUIREMENTS FOR THE RADIOLOGICAL EXAMINATION OF THE KWPN - ROYAL DUTCH SPORT HORSE - MARES AND STALLIONS 2024.

A complete set of radiographs for the review of the veterinary assessment committee must be of excellent radiotechnical quality according to projection and exposure.

Provide X-ray images in DICOM format.
Flip horizontal, flip vertical and/or rotation is not allowed.

Annotations must consist of at least: veterinary practice, microchip number, date of X-ray examination, view and the indication of the legs.

The following projections are required.

Front leg, both sides:

Navicular bone (including pedal bone and distal part of the first phalanx)

- **LM/ML** (LateroMedial/MedioLateral) view
- **D55Pr-PaDiO** (Dorso55°Proximal-PalmaroDistal oblique) upright-pedal view of the podotrochlea

For both projections the foot, after removal of the shoe, cleaning and trimming of the sole and frog, is positioned in a **block (podoblock)** which lifts the foot ±16 cm from the floor and tilts the heel 55° (upright-pedal view). For the dorso-palmar projection the frog and sole should be packed with soft soap or appropriate paste.

Fetlock joint (including the pastern joint)
- **D45L-PaMO** (Dorso45°Lateral-PalmaroMedialOblique) and
- **D45M-PaLO** (Dorso45°Medial-PalmaroLateralOblique) view of the sesamoid bones in projection without superposition of the collateral one.
- **LM** (LateroMedial) view

Hind leg, both sides:

Fetlock joint
- **LM** (LateroMedial) view
- **DPl** (DorsoPlantar) view

Hock joint, (including all tarsal joints and calcaneus)
- **LM** (LateroMedial) view
- **DPl** (DorsoPlantar) view
- **D45M-PlLO** (Dorso45°Medial-PlantaroLateralOblique view

Stifle joint
- **LM** (LateroMedial) view
- **Cd10Pr60L-CrMO** (Caudo10°Proximo60°Lateral-CranioMedialOblique) view
- **CdCr** (CaudoCranial) view

Next images required for stallions, optional for mares

Cervical spine (C0-C7):
- **SD/DS** (SinistroDextra/DextroSinistra) view

Spinal processus of the thoracolumbar spine:
- **SD/DS** (SinistroDextra/DextroSinistra) view.

Front leg – navicular bone

including pedal bone and distal part of the first phalanx

LM/ML (podoblock)
LateroMedial/MedioLateral

DPa (podoblock)
Dorso55°PalmaroDistalOblique

Front leg – fetlock joint including the pastern joint

DM-PaLO
Dorso45°Medial-PalmaroLateralOblique

LM
LateroMedial

(left front)

DL-PaMO
Dorso45°Lateral-PalmaroMedialOblique

Hind leg – fetlock joint including the pastern joint

LM
LateroMedial

DPl
DorsoPlantar

(left hind)

Hind leg – hock / tarsal joint

LM
LateroMedial

DPl
DorsoPlantar

(left hind)

DM-PlLO
Dorso45°Medial -
PlantaroLateralOblique

Hind leg – stifle joint including femoral condyles

LM
LateroMedial

Cd10D60L-CrMO
Caudal10°Dorsal60°Lateral – CranioMedialOblique

CdCr
CaudoCranial

(right hind)

Cervical spine (C0-C7)

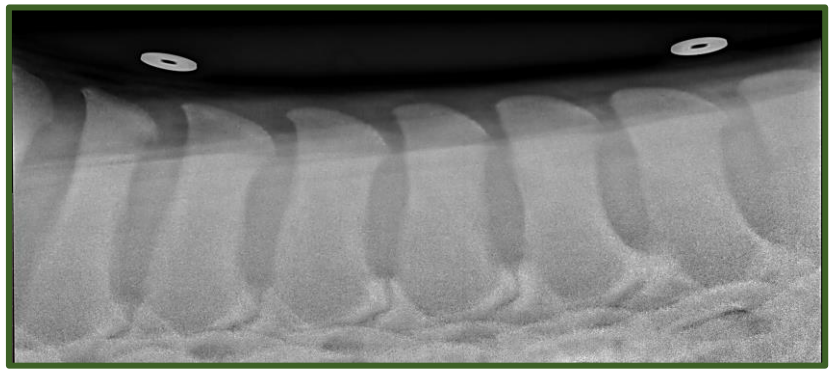
Stallions required – mares voluntarily

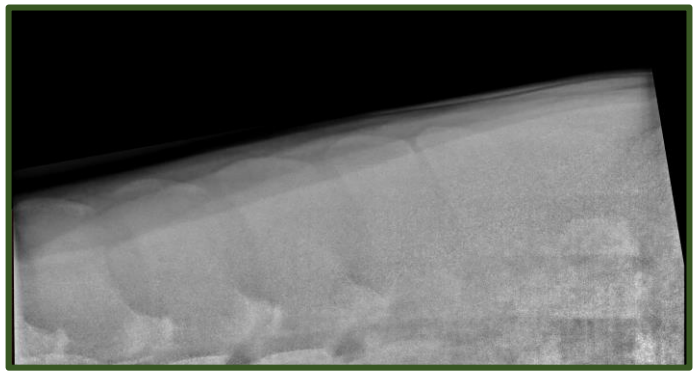
SD
SinistroDextra
(DS DextroSinistra view also acceptable)

Spinal processus of the thoracolumbar spine

Stallions required – mares voluntarily

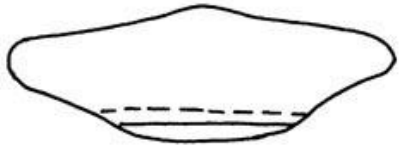
SD
SinistroDextra
(DS DextroSinistra view also acceptable)

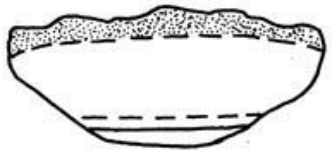




Schematic drawing navicular bone

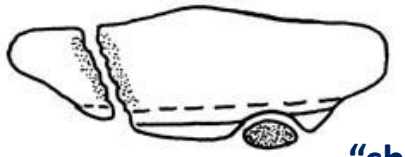
normal view





new bone formation

fracture



“chip-fracture”

spur formation

cystic lesion

vascular channels

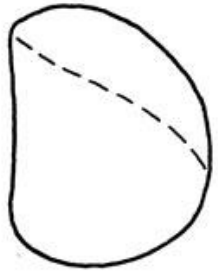
5 4 3 2 1

1 roughening distal border
2 short penetrating channels
3 moderately penetrating channels
4 deeply penetrating channels
5 inverted flask shaped channels

Radiographic classification – navicular bone (K.J. Dik)

grade	condition	radiographic findings		
		bone texture	vascular channels	shape and border
0	excellent	fine trabecular pattern, sharp interface spongiosa – compacta flexor surface	not visible, or several narrow (0.1 – 0.3 mm) conical channels	variable shape – bilateral symmetric
1	good	fine trabecular pattern, sharp interface spongiosa – compacta flexor surface	some short widened (1-3 mm) pointed or conical channels	roughening distal border
2	fair	minimal diffuse osteoporosis or sclerosis, blurring of the interface spongiosa – compacta flexorsurface	many short, or some moderately penetrating widened (1-3 mm) pointed or conical channels	“chip fragment(s)”
3	poor	extensive diffuse osteoporosis or sclerosis, loss of the interface spongiosa – compacta flexor surface	many moderately or some deeply penetrating widened (1-3 mm) pointed, conical, or rounded channels	less extensive smooth walled new bone formation along the proximal border, or small spur on the medial and/or lateral extremity
4	bad	cystic radiolucency	many deeply penetrating widened (1-3 mm) pointed or rounded channels, or inverted flask shaped channels	extensive irregular new bone formation along the proximal border, large spur(s), roughening or erosion of the flexor surface, fracture

Schematic drawing sesamoid bones / fetlock joint

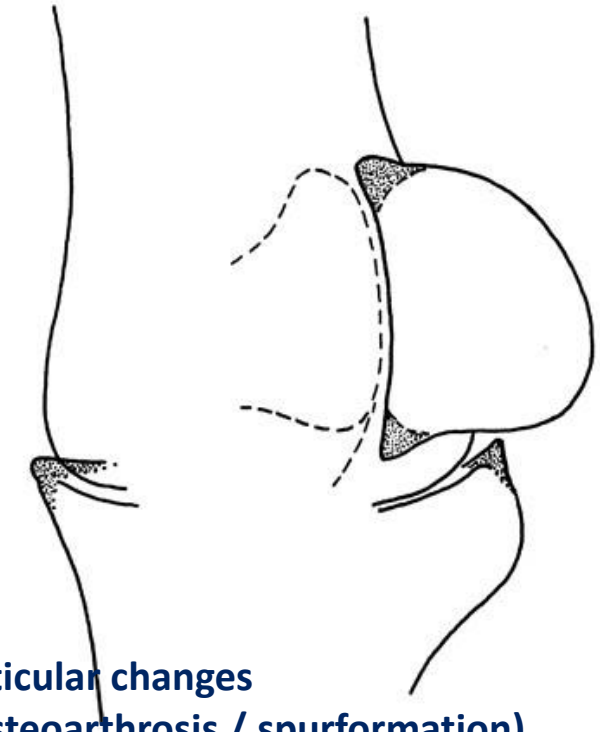


normal view

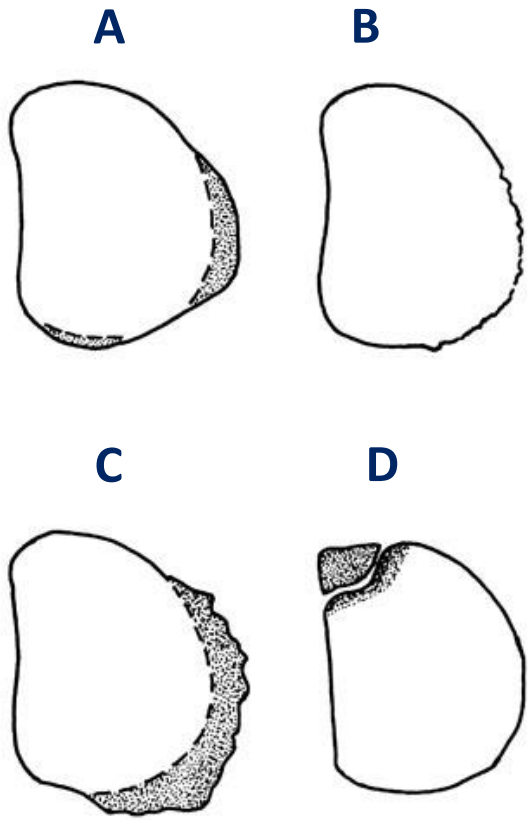
narrow sharply-bordered channel

wide sharply-bordered channel

wide ill-bordered channel



articular changes
(osteoarthrosis / spurformation)



A = little smooth walled deformation

B = roughening of the abaxial border

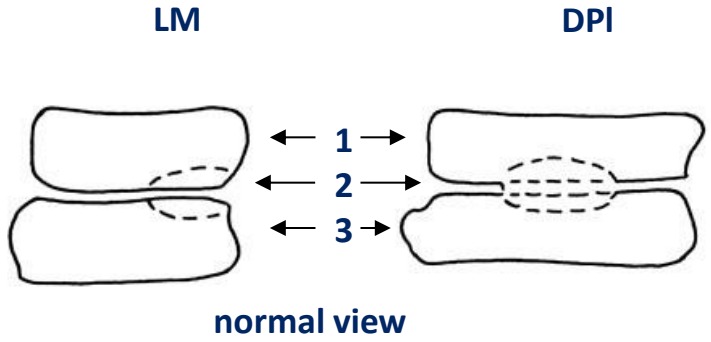
C = irregular new bone formation
along the abaxial border

D = “fracture”

Radiographic classification
proximal sesamoid bones / fetlock joint arthrosis (K.J. Dik)

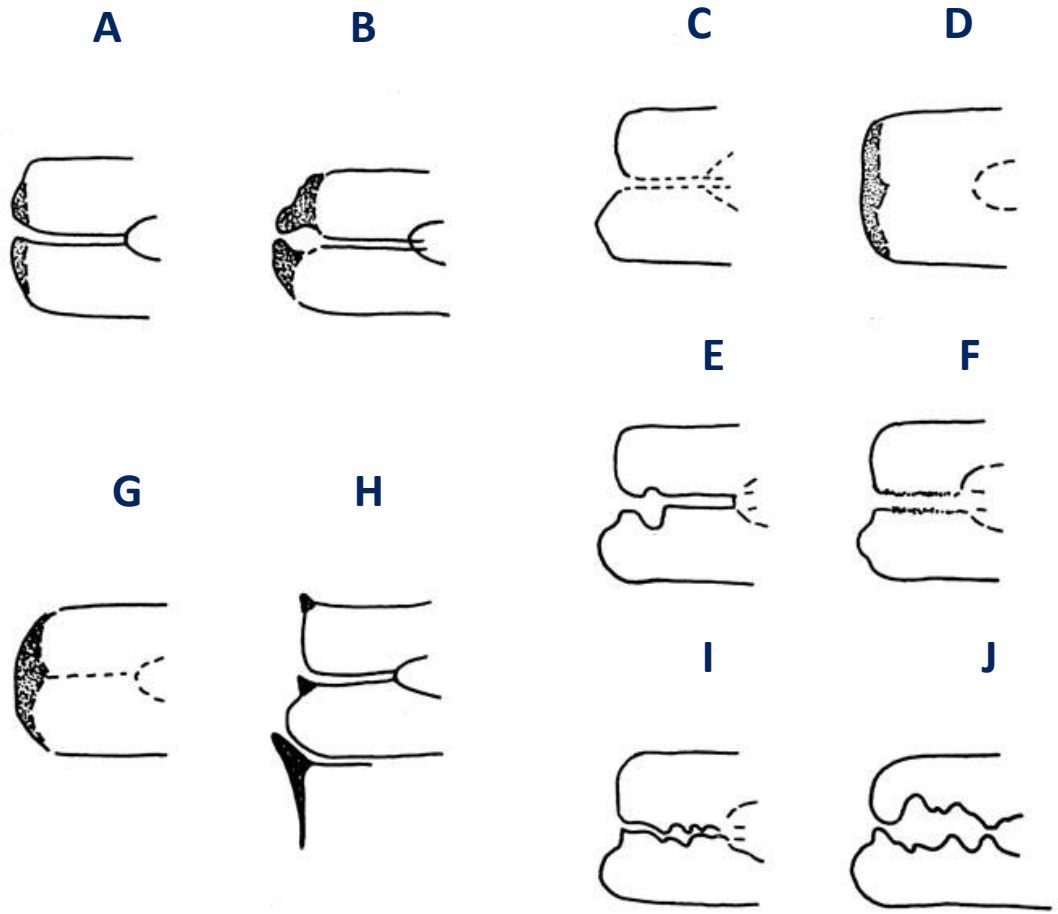
grade	condition	radiographic findings			
		bone texture	vascular channels	shape and border	joint margins first phalanx, apex / basis / sesamoids
0	excellent	fine trabecular pattern	not visible	rounded and smooth	rounded
1	good	fine trabecular pattern	some narrow (≤ 1 mm), sharply bordered channels	rounded and smooth	pointed
2	fair	minimal local, or diffuse textural irregularity	many narrow (≤ 1 mm), or some wide (1 – 3 mm) sharply bordered channels	limited smooth walled deformation	small spur(s)
3	poor	moderate local, or diffuse textural irregularity	some wide (1 – 3 mm) ill bordered channels	roughening of abaxial border (“sand-paper) appearance	moderate spur(s)
4	bad	extensive local, or diffuse textural irregularity	many wide (1 – 3 mm) ill bordered channels	(extensive) irregular new bone formation along the abaxial border	large spur(s)

Schematic drawing small tarsal bones / joints



normal view

1. central tarsal bone
2. distal intertarsal joint space
3. third tarsal bone



A. limited smooth wall deformation
B. extensive irregular deformation
C. blurred joint space
D. obliterated joint space

E. subchondral indentation
F. roughening of the joint space

G. obliterated joint space (ankylosis)
H. spur(s)

I. irregular and narrowed joint space
J. Irregular and widened joint space

Radiographic classification – small tarsal bones / joints (K.J. Dik)

grade	condition	radiographic findings		
		joint space(s)	bone texture	shape and border
0	excellent	narrow, smooth and well defined	uniform and dense	variable shape – bilateral symmetric
1	good	narrow, smooth and well defined	small lucent subchondral indentation	small spur(s)
2	fair	blurred, or obliterated (ankylosis)	slightly irregular, large lucent subchondral indentation, or uniform sclerosis (ankylosis)	limited smooth walled deformation, fused contour of both rows of tarsal bones, or large spur(s)
3	poor	irregular and narrowed	irregular due to new bone formation	moderate irregular deformation
4	bad	irregular and widened	(very) irregular due to a mixture of bone destruction and new bone formation, or mainly resulting from bone destruction	extensive irregular deformation, collapse, fracture, fragmentation

COMPARISON OF RADIOGRAPHIC AND SCINTIGRAPHIC FINDINGS OF THE SPINOUS PROCESSES IN THE EQUINE THORACOLUMBAR REGION MARIEKE ZIMMERMAN,* SUE DYSON, RACHEL MURRAY (Vet Radiol Ultrasound 2011 Nov-Dec;52(6):661-71)

Grade	Description
0	Normal interspinous space width Rim or mild increased opacity (<2 mm) of the margins of the spinous processes No radiolucencies No modeling at the cranial or dorsal aspect of the spinous processes
1	Mild increased opacity of the margins of the spinous processes Mild radiolucency Mild narrowing of the interspinous space Mild modeling of the dorsal aspect of the spinous processes
2	Narrowing of the interspinous space with mild increased opacity of the cortical margins of the spinous processes and/or mild radiolucency Normal interspinous space with moderate increased opacity of the margins and/or moderate radiolucencies Impinging spinous processes without increased opacity of the margins or radiolucencies Overlapping spinous processes without increased opacity of the margins or radiolucencies Mild modeling at the cranial aspect of the spinous processes without increased opacity or radiolucencies
3	Impinging spinous processes with mild to moderate increased opacity of the margins and/or mild radiolucencies Narrowing interspinous space with moderate increased opacity of the margins and/or moderate radiolucencies Overlapping spinous processes with mild opacity of the margins and/or mild radiolucencies Moderate modeling at the dorsal or cranial aspect of the spinous processes
4	Impinging spinous processes with moderate to severe increased opacity of the margins and/or moderate radiolucencies Overlapping spinous processes with moderate increased opacity of the margins and/or moderate radiolucencies Severe modeling at the dorsal or cranial aspect of the spinous processes
5	Impinging spinous processes with severe increased opacity, severe radiolucencies, osteolysis, and change in shape of the spinous processes
6	Fusion of spinous processes with severe increased opacity of the margins, severe radiolucencies, and osteolysis
7	Severe congenital abnormalities: fused spinous processes, bony bridges between spinous proceses

Hoof cartilage ossification

Classification assessment of hoof cartilage ossification.
Assessment of the LM/ML image of the lower foot taken in the podoblock

- Minimal/mild ossification — extend to the level of the proximal border of the navicular bone
- Moderate ossification — remaining to the level of the distal half of the middle phalanx
- Extensive ossification — extend to the proximal half of the middle phalanx