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Abattoir study of radiographic changes of bones and joints of digital region in cattle with abnormal claws

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ABSTRACT

An abattoir study of radiographic changes of bones and joints was carried out on 94 samples with gross abnormalities of digits which were collected from Shiraz slaughterhouse. Appropriate radiographs were taken from each sample. Various radiographic changes were classified as: osteomyelitis, exostosis, alteration of bone density, deformity of bones, soft tissue calcification, rotation of phalanges, arthritis, degenerative joint diseases, ankylosis of joint, displacement of navicular bone and fracture. About 90% of arthritis and DJD were considered in distal interphalangeal joints. No radiographic changes were observed in 9.57 percent of samples.

Key words: abattoir, radiography, bone, joint, cattle

Introduction

Lame animals tend to exhibit reduced productivity (VERMUNT, 1992) and lower fertility (COLAM-AINSWORTH et al., 1989), which has economic implications for dairy producers (SINGH et al., 1993; BOELLING and POLLOT, 1998). Lameness resulting from sore hooves may discourage cows from standing and thus decrease feed intake, leading to lower milk yields (GREENOUGH and VERMUNT, 1991). Apart from production concerns, lameness can be a problem with respect to animal welfare (LOGUE et al., 1994; BOELLING and POLLOT, 1998; LIVESEY et al., 1998), particularly if the animal is exhibiting gait abnormalities because of discomfort. Lame animals may be subject to pain that has the potential to become chronic, especially if lameness remains undetected for long periods of time (MANSON and LEAVER, 1988). Finally, lame animals may be culled from the herd at

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younger ages than their sound counterparts, thus shortening their lifespan (CHOQUETTE-LÉVY et al., 1985; VERMUNT, 1992).

As with many physical problems, lameness can best be corrected if detected early. Early detection allows for appropriate treatment of the affected animal and may prevent the lameness from developing into a more serious or chronic problem that could seriously affect the welfare and performance of the cow (CLARKSON et al., 1996; LOGUE et al., 1998). One of the diagnostic methods of bone and joint lesions for lameness is radiography (MURPHY et al., 1975; PHARR, 1985; TULLENERS et al., 1987; WELKER et al., 1989; BARGAI et al., 1995; BEZEK et al., 1995; O'BRIEN and BILLER, 1996; TROSTLE et al., 1997; MEIMANDI-PARIZI and RADDANIPOUR, 2005). This study was conducted to detect bone and joint lesions of digital region by radiography in cattle with abnormal digits collected from Shiraz slaughterhouse. It is a descriptive radiographic evaluation of bone and joint lesions.

Materials and methods

This study was carried out on 94 samples with gross abnormalities of digits (mainly hoof overgrown) which were collected from Shiraz slaughterhouse, Shiraz, Iran over an 8-month period. Samples were transferred to the clinical department immediately where they were then cleaned and gross abnormalities recorded. Standard radiographs of lateromedial, dorsopalmar or dorsoplantar, and oblique views, were taken from each sample. For further visualization one or two interdigital views were made in some samples. Radiography was limited to the digital region. Exposure factors of 10-20 mAs, 65-80 kV and 70 cm FFD were used. Finally, the provided radiographs were interpreted properly. The results were analyzed descriptively.

Results

Radiographs were interpreted for any radiographic changes of bones and joints of digital region. Various radiographic changes of the samples were classified as: osteomyelitis and periosteitis (Fig. 1), exostosis (Fig. 4), alteration bone density, soft tissue calcification (Figs. 1 and 5), rotation of phalanges (Fig. 3), deformity of bones (Fig. 2), arthritis, degenerative joint disease (DJD) (Figs. 1 and 4), ankylosis of joint (Fig. 5), displacement of navicular bone and fracture (Fig. 5). Arthritis, periosteal reaction and displacement of navicular bone were observed mostly in hind feet. Degenerative joint disease was observed mostly in forefeet. Other radiographic changes occurred relatively the same in forefeet and hind feet. About 90% of arthritis and DJD were observed in distal interphalangeal joint (DIJ). No radiographic changes were diagnosed in about 10 percent of samples. Details of bone and joint lesions of this study are presented in Table 1.

Table1. Radiographical findings of bone and joint lesions in 94 samples of feet collected from slaughterhouse

Type of lesions	Fore limb		Hindlimb		Total	
	Nº of cases	%	Nº of cases	%	Nº of cases	%
Osteomyelitis	1	1.06	2	2.12	3	3.18
Exostosis/Periosteal reaction	7	7.44	13	13.82	20	21.26
Bone density change	1	1.06	2	2.12	3	3.18
Soft tissue calcification	2	2.12	3	3.19	5	5.31
Deformity of bones (P_2, P_3)	7	7.44	6	6.38	13	13.82
Displacement of navicular bone	-	-	4	4.25	4	4.25
Fracture (P_2)	1	1.06	-	-	1	1.06
Rotation of phalanges	8	8.51	10	10.63	18	19.14
DJD*	6	6.38	2	2.12	8	8.50
Ankylosis of joint	-	-	6	6.38	6	6.38
Arthritis	-	-	4	4.25	4	4.25
NAD**	3	3.19	6	6.38	9	9.57
Total	36	38.29	58	61.70	94	100

*DJD = Degenerative Joint Disease **NAD = No Abnormality Diagnosed

Fig. 1. Dorsoplantar view of bovine digit showing chronic osteomyelitis with periostal reaction, subluxation of PIJ, DJD of PIJ and DIJ, interdigital soft tissue calcification in the proximal insertion of the crutiate ligaments

Fig. 2. Dorsoplantar and lateral view of the digit showing change of the distal phalanges, one of them is extremely shortened and another one is wedge shaped. These radiographic signs indicate septic inflammation of long duration.

Fig. 3. Dorsoplantar and lateral view of the digit showing medial and lateral rotation of third phalanges due to hoof overgrown as scissor claw

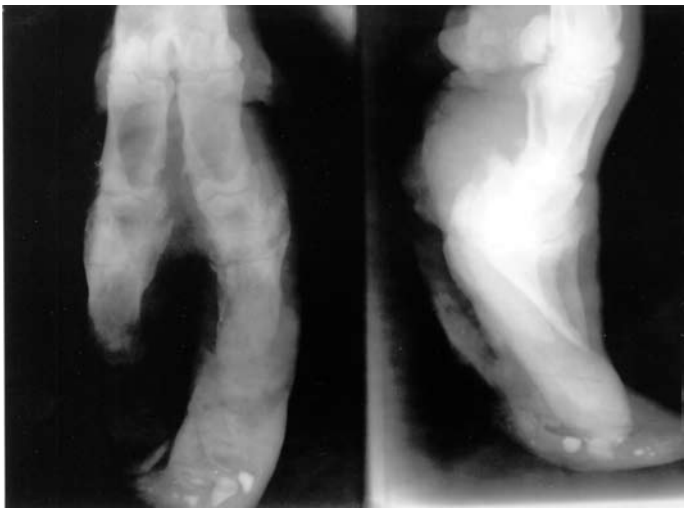

Fig. 4. Dorsoplantar and lateral view of the digit showing bilateral extensive new bone formation (exostosis) and signs of DJD in PIG and DIG. Hoof overgrown is obvious.

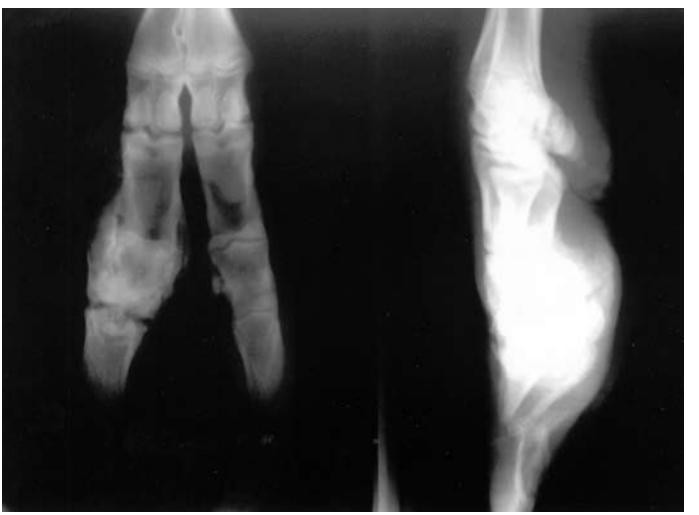

Fig. 5. Dorsoplantar and lateral view of bovine digit showinjg healing fracture of 2nd phalanx as well as fusion of PIG and widening joint space of DIJ

Discussion

In this study an attempt was made to differentiate both types of bone infection: osteitis and osteomyelitis. Prognosis and treatment of osteitis (periosteitis) and osteomyelitis are different and it is important to make a distinction between them. The best way to diagnosis these lesions is radiography. Soft tissue calcification is a common radiographic finding of ligament and tendon insertions in old cattle. In this study it was observed only in the cruciate ligaments of the first phalanx, while this lesion commonly occurs in the deep digital flexor tendon insertion and common digital extensor tendon insertion on the third phalanx (BARGHAI and PHARR, 1989). The best radiographic position for evaluation of crutiate ligament calcification is the dorsopalmar or dorsoplantar view (BARGHAI and PHARR, 1989).

In this study, about 90% of DJD had occurred in the distal interphalangeal joint. DJD is a sequlae of both traumatic and septic arthritis. In cattle, the most common joint of the foot to be affected by infection is DIJ (FARROW, 1985a; BARGAI and PHARR, 1989; CHAWLA, 1998).

A joint can be evaluated in different ways, such as gross morphological changes, arthroscopy, radiography and synovial fluid analysis (TULLENERS et al., 1987; NUSS et al., 1994; BEZEK et al., 1995; TROSTLE et al., 1997; SEMEVOLOS et al., 1998). Radiography is an important method for diagnosis of joint lesions in lameness of cattle. This method is easier than other methods of diagnosis and it is also economic in cattle. Radiographic changes can usually be seen clearly in chronic stages of joint diseases. In this study the affected joints were mainly in chronic stage.

The cause of rotation of phalanges (mainly third phalanx) and navicular bone of samples in this study has been mainly overgrown hoof. Rotation of phalanges usually leads to joint angulation. Angulation of joint should preferably be judged in the weight bearing position of an animal. Therefore, angulation of joints was not evaluated in this study.

In one study of 77 cases suffering from lameness in Shiraz dairy farms, the percentage of calcified soft tissue and DJD lesions were relatively same as in the present study. In other factors the amount of lesions of bones and joints in this study are higher than that reported by MEIMANDI-PARIZI and RADDANIPOUR, 2005.

Conclusion

It was concluded that the radiographic changes of bone and joint of the digital region are remarkable. Therefore, this should be noted in diagnosis of lameness by radiography.

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MEIMANDI-PARIZI, **A., M. A. SHAKERI**: **Radiografski utvrđene promjene kostiju i zglobova prsta u goveda s abnormalnim papcima prikupljenima u klaonici. Vet. arhiv 77**, **187-194**, **2007.**

SAŽETAK

Istraživanje je provedeno na kostima i zglobovima prikupljenima u klaonici u Shirazu od 94 goveda s poremećajima na papcima. Svaki primjerak prikazan je radiografski. Ustanovljeni su sljedeći poremećaji: osteomijelitis, egzostoze, promjene u gustoći kostiju, deformacija kostiju, kalcifikacija mekog tkiva, rotacija članaka, artritis, degenerativne bolesti zgloba, ankiloza zgloba, dislokacija navikularne kosti i frakture. Oko 90% upala zglobova i degenerativnih zglobnih bolesti utvrđeno je u distalnom zglobu. Poremećaji nisu ustanovljeni u 9,57% pretraženih uzoraka.

Ključne riječi: klaonica, radiografija, kost, zglob, govedo