

**An Historical Cohort Study of Yearling Radiographic Changes and Racing Performance in Thoroughbreds  
(FINAL PROGRESS REPORT)**

**Summary:** The purpose of this study was to identify radiographic changes in the fetlocks, proximal sesamoid bones, carpi, stifles, tarsi, or forefeet of Thoroughbred sale yearlings that might be associated with future racing performance, the occurrence of orthopaedic problems relative to these changes and the need for surgery. This study identified several radiographic changes in the joints of Thoroughbred yearlings that are associated with racing performance during the 2- or 3-year-old years. A significant effect on racing performance was not detected for many radiographic changes that one might expect to influence the future potential of a yearling (including fore fetlock fragments and cysts, sesamoid fractures, osteochondritis dissecans lesions of the tarsi or stifles).

Radiographic changes in the fetlocks, carpi, tarsi, stifles, and forefeet of Thoroughbred yearlings have a substantial impact on the sale process but can be difficult to interpret. Previously, analytic data supporting the clinician's interpretation of the significance of these changes was limited. The objectives of this historical cohort study, done by Dr Al Kane with Drs. Wayne McIlwraith, Richard Park at CSU, together with Drs. Norman Rantanen, Jim Morehead and Larry Bramlage, were to identify radiographic changes in the fetlocks, proximal sesamoid bones, carpi, stifles, tarsi, or forefeet of Thoroughbred sale yearlings that are associated with future racing performance, the occurrence of orthopaedic problems relative to these changes and the need for surgery.

Radiographs from 1162 pre- and post-sale purchase examinations conducted at the 1993 - 1996 Keeneland and Fasig-Tipton yearling sales were obtained from a private practice (Dr. Morehead) serving buyers and consignors at these sales. Joint examinations included fore fetlock (D30Pr-PaD, flexed LM, DL-PaMO and DM-PaLO), hind fetlock (D30Pr-PID, LM, DL-PIMO and DM-PILO), carpal (LM, DL-PaMO and DM-PaLO), tarsal (D10-15L-PIMO, LM and DM-PILO), stifle (LM), and fore foot (D65Pr-PaD and LM) views. The films were evaluated in a blinded manner and the type (e.g., flattening, lucency, fragment, etc) and location of radiographic changes present were categorized. Racing performance data including the number of starts, percent of starts placed, total earnings and average earnings per start were obtained from the Jockey Club Information Systems for the 2- and 3-year-old years. Sale data were obtained from the Keeneland and Fasig-Tipton Sale Companies. A questionnaire mailed to buyers was used to assess the occurrence of orthopaedic problems and the

need for surgery during the 2- and 3-year-old years.

The proportion of horses starting races was significantly ( $P<0.05$ ) lower for yearlings with moderate or extreme palmar supracondylar lysis of the distal third metacarpus (58% started, Figure 1), enthesophyte formation on fore proximal sesamoid bones (57% started, Figure 2), and dorsal medial intercarpal joint disease (63% started, Figure 3) compared with those without these changes (approximately 82% started). The odds of starting a race for yearlings with moderate or extreme palmar supracondylar lysis of the third metacarpus and dorsal medial intercarpal joint disease were only one third as great ( $P<0.01$ ) as those for yearlings without these changes. The odds of starting were one third as great with enthesophytes on the fore proximal sesamoid bones ( $P=0.05$ ), and half as great with proximal dorsal fragmentation of the first phalanx in the hind fetlock ( $P=0.07$ ) compared with yearlings without these changes.



**Figure 1. Lateromedial radiographic views of the front fetlock showing a yearling with severe supracondylar lysis (right) compared with a normal fetlock (left).**

## Summaries: Focus 2

### Early Diagnosis of Bone and Joint Disease

The percent of starts placed was significantly ( $P=0.01$ ) lower for yearlings with enthesophyte formation on the hind proximal sesamoid bones. The nine starters affected placed in 16% of their starts compared with unaffected starters that placed in 40% of their starts. Earnings were also significantly ( $P=0.02$ ) lower for horses with enthesophytes on the hind sesamoid bones (\$987) compared with horses without these changes (\$9,569), and these yearlings had significantly ( $P=0.03$ ) lower average earnings per start (\$252) compared with those without these changes (\$1,414).



**Figure 2.** An oblique radiographic view of the front fetlock showing a small enthesophyte on the lateral sesamoid bone.



**Figure 3.** An oblique radiographic view of the carpus showing proliferative changes and remodeling on the dorsomedial aspect of the radial carpal bone (inset)

Questionnaire response rate was low (16% of 1162 questionnaires mailed provided useable data) which limited the confidence with which these data could be analyzed. Among twenty-seven of 177 horses (15%) reported as having a fore fetlock problem during the balance of the yearling year or the two- or three-year-old years, joint effusion and the need for frequent intra-articular medications were the most common problems reported. Only fragmentation of the proximal dorsal aspect of the first phalanx (Figure 4) was significantly ( $P = 0.04$ ) associated with fetlock surgery during the follow-up period. Changes found on the sagittal ridge (52 horses) and distal palmar aspect of the condyles (66 horses) of the third metacarpus were not associated ( $P = 0.64$ ) with fetlock surgery. Nine horses (5%) had a problem in a fore proximal sesamoid bone during the two- or three-year-old years with sesamoid fracture as the most common problem reported. The occurrence of a sesamoid problem was associated ( $P = 0.02$ ) with having two or more circular lucencies in a proximal sesamoid bone as a yearling. Surgery on a proximal sesamoid bone was performed on one of the five yearlings with two or more circular lucencies in a proximal sesamoid bone as a yearling ( $P = 0.03$ ).



**Figure 4.** A lateral radiographic view of the fetlock showing a small fragment in the dorsal aspect of the joint.

Ten horses (6%) were reported to have hind fetlock problems among 174 included in the study with complete hind fetlock radiographs and clinical follow-up. The presence of a fragment with no indication whether this was associated with clinical signs was the most common problem reported. Five of the nine yearlings (56%) with fragmentation of the proximal dorsal aspect of the first phalanx had surgery ( $P = 0.0004$ ). Fragmentation of the proximal palmar aspect of the first phalanx was also associated ( $P < 0.0001$ ) with surgery regardless of whether the fragments were articular (2 of 6 had Surgery) or nonarticular (6 of 12 had Surgery).

Twenty (11%) of 178 horses with a complete radiographic examination of the carpus and clinical follow-up were reported to have a carpal problem during the two- or three-year-old years. The most common problems reported were the occurrence of chip (8 horses) or other fractures (4 horses). An association ( $P = 0.004$ ) was detected between the development of a carpal problem during the two- or three-year-old years and the presence of carpal osteophytes at the time of the yearling sales. Eight horses (4%) had surgery with removal of fragments the most commonly reported procedure (6 horses). The presence of a carpal osteophyte was associated ( $P = 0.01$ ) with carpal surgery (2 of 4 affected had surgery) during the two- or three-year-old years.

Tarsal problems were reported for 15 of 173 (9%) horses with a complete radiographic examination of the tarsi and follow-up data. Chronic soreness or stiffness and osteoarthritis were the most common problems reported. Concavity or fragmentation of the intermediate ridge of the distal tibia was associated with the occurrence of tarsal problems ( $P = 0.03$ ). There was also a significant ( $P = 0.0005$ ) association between these changes and the need for surgery during the yearling year (3 of 10 affected had surgery).

A stifle problem was reported for 8 of the 137 horses (6%) with complete radiographic examinations of the stifle and follow-up data. None of the radiographic changes observed were associated with these problems. Stifle surgery for osteochondritis dissecans was reported for three horses as yearlings and one as a two-year-old. There was a significant association between surgery and the appearance of defects or fragments involving the lateral ( $P = 0.008$ ) and medial ( $P = 0.04$ ) trochlear ridges as well as the trochlear groove ( $P = 0.04$ ).

## Discussion

This study identified several radiographic changes in the joints of Thoroughbred yearlings that are associated with racing performance during the 2- or 3-year-old years. It should not be surprising that supracondylar lysis of the distal palmar third metacarpus was associated with decreased probability of starting a race. This lesion is recognized as a sign of chronic inflammation of the fetlock joint, and has been associated with decreased likelihood of returning to function among older horses. Enthesophytes and signs of dorsal medial intercarpal joint disease are also recognized as an early manifestation of osteoarthritis. This is consistent with the results reported here, that yearlings with these lesions are less likely to start a race during their 2- or 3-year-old years. A significant effect on racing performance was not detected for many radiographic changes that one might expect to influence the future potential of a yearling (e.g. fore fetlock fragments and cysts, sesamoid fractures, osteochondritis dissecans lesions of the tarsi or stifles). The reader should recognize, however, that many of these lesions are rare and affected only a few horses in the study. As a result the ability to detect a significant effect if one truly exists (power of the study) is likely to be low for many of these comparisons. Also, lesions that were successfully treated with surgery soon after the yearling sales may not appear to have an effect in this study.

Results of this study should be used in parallel with a clinical impression based on one's personal experience to best evaluate yearling films. As future studies confirm or refute areas of concern brought to light with this study, an even greater foundation of hard evidence on which to base purchase decisions will be built.

## Publications

Kane, A.J., McIlwraith, C.W., Park, R.D., Rantanen, N.W., Morehead, J.P., Bramlage, L.R. The effect of yearling radiographic changes on future racing performance. Abstract in: Proceedings, 11th Annual ACVS Veterinary Symposium 2001.

Kane, A.J., McIlwraith, C.W., Park, R.D., Rantanen, N.W., Morehead, J.P., Bramlage, L.R. The prevalence of radiographic changes in Thoroughbred yearlings. Abstract in: Proceedings, 46th Annual Convention of the AAEP 2000;46:365-369

Summaries: Focus 2  
*Early Diagnosis of Bone and Joint Disease*

Kane, A.J., McIlwraith, C.W., Park, R.D., Rantanen, N.W., Morehead, J.P., Bramlage, L.R. The effect of radiographic changes in Thoroughbred yearlings on future racing performance. Abstract in: Proceedings, 46th Annual Convention of the AAEP 2000;46:370-374

Biles, D.B. Graphic Language. The Blood-Horse 2000;December 2:7688-7689

Kane, A.J., Park, R.D., McIlwraith, C.W., Rantanen, N.W., Morehead, J.P., Bramlage, L.R. Radiographic changes in Thoroughbred yearlings. I. Prevalence at the time of the yearling sales. Accepted, Equine Vet J, 2001.

Kane, A.J., McIlwraith, C.W., Park, R.D., Rantanen, N.W., Morehead, J.P., Bramlage, L.R. Radiographic changes in Thoroughbred yearlings. II. Association with racing performance. Accepted, Equine Vet J, 2001.

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