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Introduction: Comparative animal models are needed for the development of orthopedic treatments in the human knee. Ideal animal models approximate human body weight, joint size, and biomechanics. The postero-distal slope of the tibial plateau, measured as the tibial plateau angle (TPA), influences knee biomechanics and alters the implantation of knee replacement systems. The dog, when compared with the human, is much smaller and has a steep TPA, making it a less than ideal model for human orthopedic research. The ovine more closely approximates the knee joint size and body weight of the human, however the TPA has not been extensively studied.

Purpose: The purpose of this study was to radiographically define the Tibial Plateau Angle in the adult ovine knee.

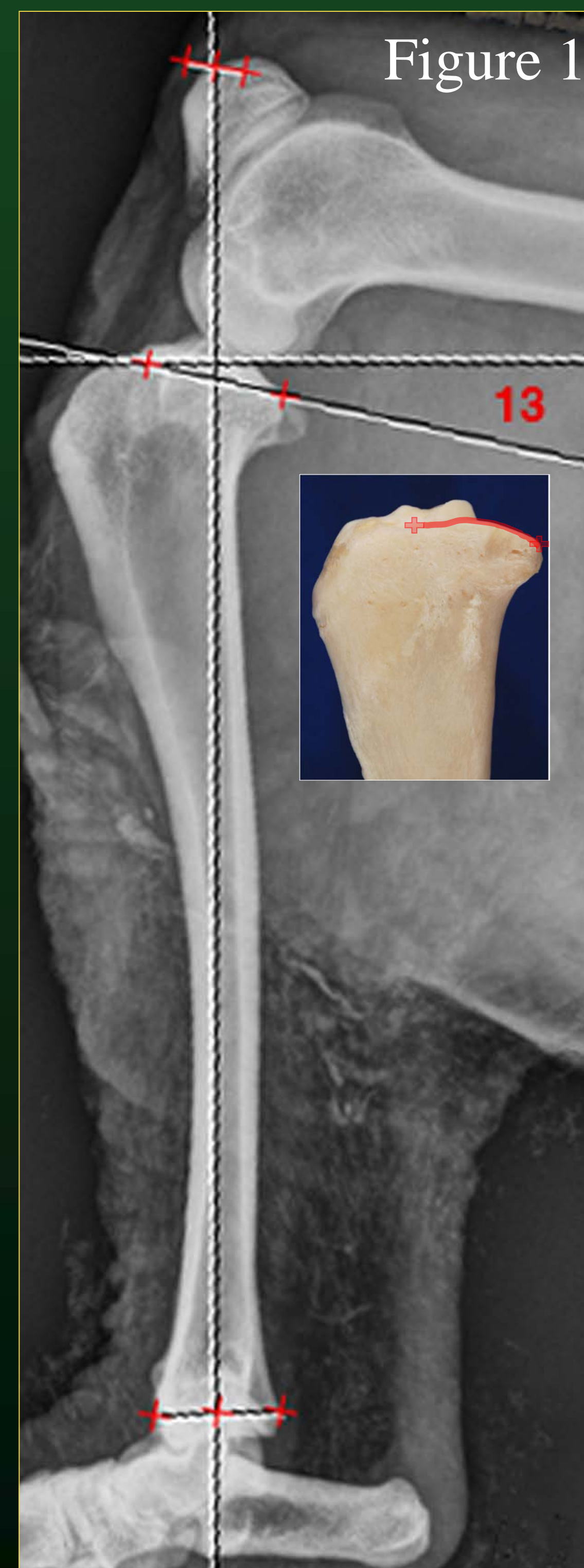
Materials and Methods:

Study Design:

- N = 72 pelvic limbs (36 ewes)
- Skeletally-mature
- Columbia Rambouillet cross
- Tissues harvested in accordance with IACUC policy
- Digital radiographs (knee and tarsus flexed ~ 90°).

Tibial Plateau Angle [TPA] Measurement (Figure 1):

- *Tibial mechanical long axis* = line drawn from intercondylar eminence of proximal tibial surface through center of the distal tibia
- *Tibial plateau* = line drawn between the anterior and posterior articular margins of the medial tibial plateau
- *TPA* = angle formed between a line perpendicular to tibial mechanical long axis and the line of the medial tibial plateau slope.



Results: The TPA of the ovine knees is summarized in the table below:

| | Left Knee | Right Knee | Left and Right Knees |
|--------------------|-----------|------------|----------------------|
| Mean | 12.7° | 12.5° | 12.6° |
| Standard Deviation | 2.6 | 3.5 | 2.8 |
| Median | 12.5 | 12.5 | 12 |
| Range | 8.5 - 21 | 8 - 20 | 8 - 22 |

Discussion and Conclusions: The posterior slope of the tibial plateau plays an important role in the biomechanics of the human knee. The TPA in the human knee has been reported as 10°± 4° by Jaing et al. The dog, in contrast, has a relatively steep tibial plateau slope, (TPA 23.5°- 28.3°). *The ovine, with body weight, knee joint size, and TPA that approximates that of the human, appears to be an outstanding comparative animal model for treatments of the human knee including anterior cruciate ligament (ACL) reconstruction, total knee replacement, hemi-arthroplasty, and meniscal repair.*



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