INTRODUCTION: This study evaluates quantitatively the bone formation due to periosteum and bone marrow-endosteum in distraction osteogenesis.

MATERIALS AND METHODS: For each femur of 18 NZW 2.4-3.0 kg rabbits, a custom-made external fixator was fitted with a 2.4-3.0 kg rabbit's femur. Eighteen surgical procedures were performed:

1. Femora were treated according to their preservation (+) or destruction (-): P+ BM+ (5 animals); 2) P+ BM- (5); 3) P- BM+ (5); 4) P- BM- (3). From POD 30, femora were harvested with a 0.5 to 1.0 mm muscle layer.

RESULTS: X-ray evaluation showed that BM forms bone around the distraction gap and area. When BM is destroyed, periosteal bone formation fills the distraction site, and P forms bone along the elevated P and covers it.

DISCUSSION: Quantitatively, the P contributes more than the BM, as BM deposits new bone around itself, at the fracture, or in the muscle. The spatial distribution of the bone formed is different for P and BM: BM deposits new bone around itself, at the fracture or distraction site, and P forms bone along the elevated P and covers it.

CONCLUSION: A synergistic effect (spatial and qualitative) may result from the combination of periosteum and bone marrow-endosteum in bone healing.