A Holstein heifer that delivered following amputation of a fractured limb

R. SATO, T. SUMIYOSHI¹, A. TSUKAMOTO, E. KANAI, K. KAWAI, Y. SHINOZUKA, H. OCHIAI, K. ONDA

School of Veterinary Medicine, Azabu University, 1-17-71 Fuchinobe, Chuo-ku, Sagamihara, Kanagawa, 252-5201, Japan
¹ Kanagawa Agricultural and Mutual Aid Association, 43-2 Kamikasuya, Isehara, Kanagawa, 259-1141, Japan

SUMMARY
A 30-month-old Holstein heifer was pushed by another cow in the same barn and fell, and subsequently presented with bleeding from the medial side of the lower left tibia, with non-weight-bearing lameness in the left hind leg. At the first physical examination, body temperature was 41.8°C, heart rate was 140 BPM, respiratory rate was 60 breaths per minute, and swelling and abnormal movement in the lower left leg were confirmed. Furthermore, a 5 × 10 cm open wound with bleeding was present in the medial side. A fractured tibial stump was palpable internally. A blood test confirmed a low hematocrit value. Digital radiography performed to examine showed a spiral fracture of the left tibia. In addition, a rectal examination confirmed the survival of the fetus. Although surgical correction presented difficulties because of necrosis in the tissues surrounding the fracture site, we were of the opinion that the pain could be eliminated and the pregnancy could be maintained by amputation of the limb at the level of the femur. At three weeks following the amputation, the heifer could stand, and was able to walk at four weeks. Pregnancy was maintained until the last trimester, and a healthy calf was delivered through a cesarean section. In the present case, amputation was shown to be a useful method to maintain a pregnancy toward the full term for a heifer in second/third trimester where a treatment of lower leg fracture with reduction through external or internal fixation was difficult.

KEY WORDS
Limb amputation, fracture, tibial bone, cow.

INTRODUCTION
There are more reports on digit amputation than limb amputation in cows. Several reports of limb amputation were found for chronic infections of joints, open fracture of long bones, and osteomyelitis in calves and heifers. There is a report of comminuted fracture in a three-year-old cow after a delivery, but there is no report of amputation in order to maintain a pregnancy. In the present case, we performed a limb amputation (femur-tibial amputation) for a five-month pregnant Holstein heifer that presented with an open spiral fracture of the tibia. We report that pregnancy was maintained until the final stage, and a healthy calf was delivered through a cesarean section.

CASE HISTORY
The present case subject was a 30-month-old Holstein heifer on a dairy farm; at the visit, it weighed 430 kg and was five-months pregnant. The heifer sustained a fall after being pushed by another animal in a free barn, and was admitted to our hospital 5 days later. The animal was febrile, and hemorrhage arising from the medial lower left hind limb was noted. Despite administration of anti-inflammatory and antibiotic medications prior to admission, the animal’s condition gradually worsened. The heifer was referred to Azabu University Veterinary Teaching Hospital. On admission, rectal temperature was 41.8°C, heart rate was 140 BPM, and respiratory rate was 60 breaths per minute. Swelling and abnormal movement in the lower left leg was confirmed (Fig. 1). Moreover, a 5 × 10 cm open wound with bleeding was confirmed on the medial side, and a fractured tibial stump was palpable internally. Digital radiography performed to examine showed a spiral fracture of the left tibia (Fig. 2). In addition, survival of the fetus was confirmed through a rectal examination. The proposed surgical correction was put in doubt because of necrosis in tissues surrounding the fracture site. However, other than fever and low hematocrit value in a blood test, there was no deterioration in the general condition. Since the animal’s weight was relatively low on the second day (430 kg), we decided to perform amputation of the left hind leg at the femur. This was performed to eliminate the pain and maintain the pregnancy. Procaine penicillin G (9000 IU/kg) was administered intramuscularly to prevent perioperative infection. Under general anesthesia, the affected limb was hoisted with the assistance of a crane and secured.
Assuming the amputated stump would ultimately be covered, the skin was incised around the whole circumference at 15 cm distal from the knee joint (Fig. 3). Incision in the muscle was made from the medial side. While ligating and controlling bleeding from external and internal saphenous veins, the saphenous artery, and small vessels, we resected the peroneus tertius, tibialis anterior, flexor hallucis longus, tibialis posterior, flexor digitorum longus, flexor digitorum superficialis, and gastrocnemius. The extensor digitorum lateralis, peroneus longus, and triceps surae were resected on the lateral side. After sawing the lower leg at the muscle section, the tibia was removed from the femur at the knee joint, the knee joint was covered using the peroneus longus and triceps surae flaps that had been spared. Subcutaneous tissue was continuously sutured using synthetic absorbable suture, and the skin was closed using single interrupted nylon suture.

Following the operation, the heifer was kept separate in a stall. To prevent postoperative infection, procaine penicillin G (9,000 IU/kg) was intramuscularly administered for five days. The heifer could not stand immediately after the amputation, but could stand on its own when hoisted with a crane. With hoisting once a day, the duration of standing gradually increased, and on the 21st day of hospitalization, the heifer was able to stand up on its own (Fig. 4). Furthermore, the heifer was able to walk starting on the 28th day. However, from around the 42nd day, the duration of standing decreased, and the heifer had difficulty standing up on its own. With increased time in the prone position, a large number of bedsores developed. As emaciation and deterioration of the general condition progressed, a cesarean section was performed on the 99th day to deliver the fetus.
DISCUSSION

This case showed that limb amputation was a useful method in maintaining a pregnancy in second/third trimester toward the final stage. Amputation is selected as the final treatment for fracture, osteomyelitis, but in cows, there are more reports of fracture than limb amputation. In horses, there are reports of limb amputation due to infection resulting in a joint, open fracture of long bone, and osteomyelitis in calves and heifers. In adult cows, there is a report of an amputation for a three-year-old cow for comminuted fracture of the tibia after a delivery, but there has not been any report of an amputation in order to maintain a pregnancy. When selecting an amputation, it must be determined if the burden on the other limbs can withstand the load. In the present case, there was no deterioration of the general condition other than fever, and although there was no weight on the affected leg, there was no functional abnormality in walking with the other three legs. Prognosis of limb amputation is good for a short term, but in the long term, the prognosis will depend on the body weight and amount of exercise.

The present heifer was in its first pregnancy and was relatively light at 430 kg, but with progress of the pregnancy, increased burden on the other three limbs was expected with the increased weight; thus, following the operation, the heifer was kept separate in a stall with sufficient space, limiting the amount of movement, and was hoisted at least once a day. As a result, the heifer was able to stand up on its own three weeks after the operation, and was subsequently able to walk. However, as predicted, the burden on the other three limbs increased progressively, the amount of time spent in a prone position increased, and bedsores developed. Deterioration in the general condition was noted three months postoperatively, and it was determined that the pregnancy could not continue beyond this point. Therefore, the fetus was delivered through a cesarean section.

In the present case, because of the limb amputation, the mother cow's productivity as a dairy cow could not be expected; however, because of the limb amputation, the pregnancy could be maintained until the last trimester and the calf could be delivered. For valuable animals such as pregnant cows, if the amount of exercise can be limited postoperatively and the burden on the other limbs can be lightened, limb amputation can be a useful option for maintaining a pregnancy from second and third trimester.

References