REPUBLIC OF TURKEY
YUZUNCU YIL UNIVERSITY
INSTITUTE OF HEALTH SCIENCE

STUDIES ABOUT EXTREMITY DISORDERS AND TREATMENT OPTIONS IN NEONATAL RUMINANTS

Kwestan Mahmood SAEEDALAH
DEPARTMENT OF SURGERY
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MASTER THESIS

SUPERVISOR
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CONTENTS

ABBREVIATIONS

ROM	:	Range Of Motion
CFT	:	Congenital Flexed Tendon
DDF	:	Deep Digital Flexor
SDF	:	Superficial Digital Flexor
MC	:	Metacarpal
DFT	:	Deep Flexor Tendon
SFT	:	Superficial Flexor Tendon
PVC	:	Polyvinylchloride
DCP	:	Dynamic Compression Plate
Ca	:	Calcium
P	:	Phosphorus
SESFS	:	Semicircular External Skeletal Fixation System
LCP	:	Locking Compression Plate
C°	:	Celsius
Gm	:	Gram
Kg	:	Kilogram
Cm	:	Centimeter
IM	:	Intra Muscular
M	:	Meter
Mm	:	Millimeter
BW	:	Body Weight
USP	:	Unique Selling Proposition

FIGURES

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1. INTRODUCTION

1. 1. Congenital Flexor Tendon Contraction In New-Borns Ruminants

Flexor tendon contraction is probably the most widespread abnormality of the musculoskeletal system of new-born calves (Simon et al., 2010; Ochube et al., 2014). Tendon injuries leading to loss and decrease the degree of production (Yardimci et al., 2012). Tendon disorders may be congenital or acquired (Ochube et al., 2014; Cockcroft, 2015). Congenital flexed tendons (CFT) are usually basically in the forelegs and generally bilateral usually include the carpal or fetlock joints (Weaver et al., 2005; Yardimci et al., 2012). At birth, the pastern and fetlock of the forelimbs and sometimes the contraction of the carpal joints are in different degrees because of shortening of the deep digital flexors (DDF), superficial digital flexors (SDF) and associated muscles (Ochube et al., 2014). The deformity may be mild, moderate or severe (Larson, 2010; Parrah et al., 2013; Ochube et al., 2014; Fazili et al., 2014). Older animals may acquire tendon contraction as the result of nonuse following trauma, fracture or neurologic disorders (Cockcroft, 2015).

Etiologic source it is usually due to congenital shortening of the flexor tendons (Cockcroft, 2015). A common cause of fetal deformities in domestic animals is eating locoweeds, that leading to twisted, deformed limbs that develop from flexor tendon contraction of the limbs, and abnormal development of the bones and joints. Others congenital cause of flexor tendon contraction like inherited factors in utero nutrition, malposition (Fazili et al., 2014). Also in large size calves, during gestation time within the uterus this condition may be caused by positioning problems (Larson, 2010; Cockcroft, 2015).

The affected new-borns ruminants showing the change of physical examination for instance, the calves reduce the range of motion (ROM) bilaterally on an extension of the carpal joints. The affective calf is unable to properly extend on there legs usually forelimb (Larson, 2010; Parrah, 2013). Another signs showing that no reaction during extension of affected limb, and without any joint swelling (Weaver et al., 2005).

The diagnosis can be easily made by abnormally flexed site of the affected limb (Fazili et al., 2014). The animal with contracted tendon must be examined closely to determine if it has other congenital deformities (Larson, 2010). Another way for diagnosing congenital flexor tendon contraction is radiograph of the affected forelimb (Watson et al., 2013). Successful treatment of flexural deformities depend on the position, severity of the deformity and the proper use of medical, physical, and possible surgical treatment (Anderson et al., 2008).

1. 2. Fracture

Extremity fractures are frequently seen in calves. Metacarpal and metatarsal bone fractures of the bovine are 50% (Öztaş and Avki, 2015). The most common reason for metacarpal fractures in calves is excessive pulling during delivery. Other causes that may lead to metacarpal fractures are due to hitting by other animals or falling or moving objects (Arican et al., 2014; Belge et al., 2016). Metacarpal fractures of the long bone in the calves are the first rank (Belge et al., 2016). The most common fractures in cattle are including, metacarpus (50%), metatarsus (50%), femur (14%), (Bilgili et al., 2008; Nichols et al., 2010; Rodrigues et al., 2012a), radius-ulna (7%) (Gorgul et al., 2004), and rarely fractures of the phalanges (<1%) (Marchionatti et al., 2014; El-Shafaey et al., 2014). In calves, metacarpal fractures often most occur in the distal epiphysis, metaphysis and more comminuted transverse fractures (Belge et al., 2016). X-ray (radiography) gives significant information for diagnosing of bone fracture (Ewoldt et al., 2003).

The management fracture focus mainly on a restoration of the capacity and physical integrity with the minimum deformity of bone. For the treating fracture in the calf, different methods are use such us internal and external fixation methods, coaptation cast, transfixion pinning, intramedullary pinning, bone plates and intra fragmental compression screws (Alam et al., 2014). Surgical treatment alternatives for bovine long-bone fractures. The most metacarpal fractures have been described dominatingly in calves and young cattle (Belge et al., 2016). The transfixion pinning and casting techniques are additionally used especially for the reduction and fixation of fractures of metacarpus/metatarsus, radius ulna, and tibia (Aksoy et al., 2009).

1. 3. Bow-Leg and Knock-Knee

A knock-kneed cattle may have turned-out front legs which may eventually cause to overgrown outside claws. The animals are often narrow in their stand position and may roll their legs as they walk and they can also be wide on their shoulders. Bow-legged presents a more significant problem. A more serious problem happens where the legs are wide at the hocks bow-legged, but the feet are turned in. The additional strain is placed on the ligaments of the hock joints causing lameness and even permanent damage (Cumming, 1999).

The most cases in domestic animals give rise by a dietary insufficiency of either vitamin D or phosphorus, however periodically inherited forms are reported. In most cases, vitamin D deficiency results from a poor diet and insufficient exposure to the sunshine (Dittmer and Thompson, 2011; Radwinska and Zarczynska, 2014). Low vitamin D levels which may be made phosphorus deficiency, adds to changes in the skeletal system and improvement of rickets in young animals (Radwinska and Zarczynska, 2014). The clinical results of vitamin D deficiency are the deformity, shortening, and bow-long bones the knees can be either knock-kneed or bow-legged (Ziesemer, 2013). After once the corrected dietary phosphorus deficiency clinical recovery occurred within 6 months (Dittmer and Thompson, 2011; Radwinska and Zarczynska, 2014). According to the literature, cattle are more sensitive to phosphorus deficiency than sheep (Dittmer and Thompson, 2010).

The main purpose of the present study was to treat the affected calves by apply bandages and splint or surgery in congenital flexor tendon contraction. The surgical treatment by intramedullary nailing and plate fixation by locking compression plate (LCP) of the fractured limb, and correction knock-knee and bow-leg by administration vitamin and guide the owner let it go outside to get the sunshine.

2. GENERAL INFORMATION

2. 1. Anatomy Musculoskeletal System Of Ruminant Limbs

The musculoskeletal system comprises the skeleton, joints, muscles, tendons and ligaments. With the nervous system together, it is responsible for the animal's stand and gait (Scott, 2007).

2. 1. 1. Skeleton of ruminant limbs

2. 1. 1. 1. The skeleton of forelimb (Thoracic limb)

The skeleton is divided into the appendicular skeleton and the axial skeleton. The appendicular skeleton consists bones of the limbs and limb girdles. The thoracic limb or pectoral limb which consist of the scapula, humerus, radius, ulna, carpal bones, metacarpal bones, phalanges, and their sesamoid bones (Akers and Denbow, 2013).

Scapula:

The scapula is situated in the cranial area of the lateral wall of the chest and it is a flat bone. It is the triangular shape in outline, relatively broad at the dorsal end and narrow at the end of the ventral. The goat scapula has two surfaces, three borders, and three angles which were found to be same to those of sheep, cattle (Siddiqui et al., 2008).

Humerus:

The humerus is the largest bone in the forelimb forms at the above shoulder joint with the scapula and from the below elbow joint with the radius and ulna. The radial and olecranon fossa of the humerus are shallow in the goat, which is disagreement the fossae are deep and wide in cattle (Siddiqui et al., 2008; Akers and Denbow 2013).

Radius and ulna:

The radius is short and relatively spacious. It is somewhat oblique; at the above with humerus forms elbow joint and from below forming the carpal joint with the carpal bones. It is convex and smooth at the anterior surface. At this surface presented three grooves from the below for the accommodation of the tendons of extensor muscles (Siddiqui et al., 2008). Ulna is an ill-developed long bone, connected with the radius along it is from caudolateral aspect (Siddiqui et al., 2008). The proximal end of the ulna is called the olecranon process. The radius and ulna in the horse and ruminants connect each other because they are connected, these animals cannot rotate the wrist (pronate or supinate) (Akers and Denbow, 2013).

Carpal bones:

The carpal bones have six bones. The first carpal bone is absent in ruminants and the second and third are connected together. Which are arranged in two rows, four in the proximal row and two in the distal row (Siddiqui et al., 2008). The proximal row is consisting of radial, intermediate, ulnar, and accessory carpal. The distal row is consisting of second, third fused carpal and fourth carpal. The first carpal is absent in distal row (Siddiqui et al., 2008; Akers and Denbow, 2013).

Metacarpal bone:

The metacarpal (MC) bone is located between the carpus and digits (toes). Potentially five metacarpal bones are present, and from medial to lateral they are numbered I–V (Akers and Denbow, 2013). The animal species are differ in the number of metacarpal bone, in the cattle is present the small metacarpal bone (metacarpal-v) and in the goat, only have the large metacarpal bone which was consist of III and IV. Other metacarpal bones were absent (Siddiqui et al., 2008; Akers and Denbow, 2013).

Phalanx:

The proximal phalanx is an elongated bone and located between the second phalanx and metacarpal bone. Thee middle phalanx is located between the first and distal phalanges and it is shorter than the proximal phalanx. The distal phalanx is resembled the shape of a hoof where the whole of the bone is located. Proximally it is connected with the distal end of the middle phalanx. The solar surface is a little concave and flat (Siddiqui et al., 2008).

Sesamoid bones:

The sesamoid bones are four in numbers, two for each digit. These bones are placed palmar to the fetlock joint. Two distal sesamoid bones have existed one for each digit. The distal sesamoid bones are placed primarily in between the middle and distal phalanx. In the dogs, just a single sesamoid bone is present for the dewclaw (Siddiqui et al., 2008; Akers and Denbow, 2013).

2. 1. 1. 2. Skeleton of hind limb (pelvic limb)

The skeleton of the pelvic limb consists of the bones of the pelvic girdle, described with the pelvis (Budras et al., 2003). The pelvic girdle comprised of two os coxae each of them have three bones: ilium, pubis, and ischium, the pelvic floor created by pubis and ischium (Rajani et al., 2013).

Femur (thigh):

The largest bone, in the hind limb is femur bone. It is communicates proximally with the os coxae at the acetabulum producing the hip joint, distally with the tibia forming the stifle joint (Akers and Denbow, 2013; Schimming, 2015).

The tibia and fibula:

The tibia and fibula are located between the femur and metatarsal bones. The tibia is detected medially, and is the weight bearing bone of the crus (Akers and Denbow, 2013). The bones in the knee joint are consist of a femur, tibia, and patella. The fibula is situated further laterally and is no weight bearing. Distally, the fibula communicates with the tibia and the fibular tarsal bone (Schimming, 2015).

The tarsus (Talus):

The tarsus bone is between the crus and metatarsal section consists of the three rows of bones. Same as the carpus, this area is characterized by various bones arranged in several rows. However, the hock has supplementary complicated arrangement than the carpus, with a proximal row a kind of intermediate bone, and then a distal row. In all of the species, the proximal row contains two bones. The talus or tibial tarsal bone is one of the two largest bones of the tarsus. The situation of the talus is dorsomedially and it is communicates with the tibia. The calcaneus or fibular tarsal bone is the another bone in the proximal row, only lateral to the talus. The calcanean tuberosity is a large process of the calcaneus acting as a lever for the common calcanean tendon and is frequently called the point of the hock (Akers and Denbow, 2013).

Metatarsal bones and digits:

Metatarsal bones and digits are situated distal to the tarsus in ruminants, distinguished into third (III) and fourth (IV) metatarsal bones first and fifth metatarsal bones are no present, and the second is minimized to a tiny element (Akers and Denbow, 2013; Schimming, 2015). The digits of the pelvic limb follow such pattern as in the thoracic limb: each weight bearing digit consists of three phalanges, with paired sesamoid bones on the plantar side of the metacarpophalangeal joint and a single distal sesamoid on the plantar side of the distal interphalangeal joint (Akers and Denbow, 2013).

The distal phalanx is similar to the appearance of a hoof. The dorsal border is small width and sharp (Rajani, 2013).

2. 1. 2. Joints of limbs

2. 1. 2. 1. Joints of the forelimb (Thoracic limb)

* Shoulder or humeral joint

* Elbow joint (humeroulnar joint, articulation humeroulnaris)

* Carpal joint

* Fetlock (metacarpophalangeal) joint

* Pastern (proximal interphalangeal) joints

* Coffin (distal interphalangeal) joints (Budras et al., 2003; Al-Akraa et al., 2014).

2. 1. 2. 2. Joints of the hind limb (Pelvic limb)

* Hip joint

* Stifle joint

* Proximal tibiofibular joint

* Distal tibiofibular joint

* Tarsal (hock) joint

* Pastern (proximal interphalangeal) joints

* Coffin (distal interphalangeal) joints (Al-Akraa et al., 2014).

2. 1. 3. Muscle and tendon of ruminant limbs

The whole body or body part each motivation of them is created by the involvement of many muscles either simultaneously or one after another. Muscles, which be made up the same impact are known as synergists. The muscles responsible for the dissimilar action are called as antagonists (Bragulla et al., 2004).

The muscles of the forelimb jointly with the joints and ligaments are responsible for the motions of the several parts of the limb. Their chief function is flexion and extension of the joints, but abduction, adduction, and turning are also prospective, depending on the composition of the joint which they impact (Bragulla et al., 2004).

The muscles of the digits are powerful tendinous muscles, which embed the ante brachial skeleton. They appear proximal to the elbow joint from the humerus or the forearm and go around with long tendon over the carpus to enter on the separate part of the digits (Bragulla et al., 2004).

The species-specific development of the limbs resulted in the deficient range of movement of the phalanges. The phalangeal joints are uniaxial hinge joints majority in the domestic mammals, a little are biaxial saddle joints, with the significant motivation being extension, flexion and permission a very limited degree of abduction and adduction (Bragulla et al., 2004). The ante brachium muscles are into flexors and extensors. The flexors are detected on the caudomedial aspect of the forearm and the extensors are located at the craniolateral side of the fore-arm covered by the antebrachial fascia (Regal et al., 2000). The flexors originate from the medial epicondyle, the extensors from the lateral epicondyle of the humerus (Bragulla et al., 2004). The extensors, craniolaterally are extensor carpi radialis and extensor digitorium longus (Ochube et al., 2014).

The extensor carpi radialis, it is originate from the epicondyliod crest of the humerus and inserts at the metacarpal tuberosity. It expands the carpal joint and it is innervated by the radial nerve. It is the most cranial muscles to the lateral surface and the biggest. While the ulnaris lateralis which is a flexor muscle is a long acuminate muscle which lies among the lateral digital extensor cranially and the ulnar head of the deep digital flexor caudally. The ulnaris lateralis emerges from the lateral epicondyle of the humerus. It embeds by two tendons on the accessory carpal bone. It flexes the carpal joint; it is the unique flexor of the carpus that is innervated by the radial nerve which ordinarily innervates the extensors of the carpus and digits (Ochube et al., 2014).

Flexors muscle consist:

Superficial digital flexor muscle (Flexor digitorum superficialis)

In the forelimbs, the superficial digital flexor tendon appearance it is muscular portion rising from the medial epicondyle of the humerus, diagonally to the metacarpal, of the hind limbs arise in the distal and caudal portions of the femur and implant itself on the calcaneal tuberosity (Berlingieri et al., 2011). Superficial digital flexor tendon breaks down into a branch of each functional digit, that embed on the middle phalanx of these digits, before its infusion each category splits into two slips, that divide either side of the tendon of the deep digital flexor muscle, which enters further distally (Bragulla et al., 2004).

Deep digital flexor muscle (Flexor digitorum profundus)

In the ruminants, the deep digital flexor tendons in the forelimbs, come from in the medial epicondyle of the humerus, from the three heads, humerus, radial and ulnar. It has five expansions that are combined in the distal forearm and jump the carpal region medially to the accessory bone. In the hind limbs, they emerge from caudal and proximal faces of the tibia and fibula, throughout the medial face of the calcaneous inside the tarsal sheath (Berlingieri et al., 2011). The ulnar head of the deep digital flexor (DDF) is half for the reason that in the domestic ruminants, accommodation extra energy to the deep digital flexor (DDF) muscle at the time it is contraction (Constantinescu et al., 2008).

After passaging the flexor side of the carpus it splits into two tendons at the distal end of the metacarpus. In the forelimbs and hind limbs, digital flexor tendons combine into a short tendon conventional to the distal thirds of the metacarpal and metatarsal. At the point when the superficial digital flexor tendons passage the metacarpophalangeal and metatarsophalangeal area, they are collaborated by a band of intraosseous muscles enveloping the deep digital flexor tendon, which runs from the distal insertion of the superficial digital flexor tendon on palmar and plantar faces of the middle phalanx and lengthen distally on the distal sesamoid bone to its insertion into the flexor tuberosity of the distal phalanx. The is union of the superficial digital flexor tendons and the intraosseous muscle band on plantar and palmar faces is called manica flexoria in metacarpal and metatarsal phalangeal areas (Bragulla et al., 2004; Berlingieri et al., 2011).

A synovial sheath encloses the two flexor tendons of the third and fourth digit from the distal third of the metacarpus approximately to the inclusion. This digital sheath extends proximal and distal pouches. The proximal pouches reach out between the branches of the interosseous muscle to the distal third of the metacarpus. The sheaths of the medial and lateral branch contact through their proximal expansions. Several pouches extend distally between the annular ligaments and the two branches of the distal interdigital ligament to the distal phalanges. From the lateral side of the dorsal border of the flexor tendons, the sheath can be punctured, about 2 cm proximal to the dewclaws. The needle is progressed in a horizontal plane and a lateromedial bearing (Bragulla et al., 2004).

Interflexor muscles

The interflexor muscles are communal to the domestic ruminants (Constantinescu et al., 2008). The interflexor muscles are little muscles or tendons lying between the deep and superficial digital flexor muscles. They are thought to be support these muscles, although in ruminants and the pig there are proximal and distal interflexor muscles, only a distal interflexor muscle exists in carnivores, and the interflexor muscles are absent in the horse. In ruminants, the bellies of the interflexor muscle run distally in the midst of the digital flexors and radiate into the tendons of insertion of the superficial digital flexor muscle (Bragulla et al., 2004).

2. 1. 3. 1. Structure of tendon

Tendon is a uniaxial dense connective tissue (Aspinall et al., 2009) collected of highly aligned collagen fibrils organised as fibers (Zhang et al., 2005). The bones and muscles are connecting together transferring the force to the bone that created by the muscle which responds to mechanical strength by changing its metabolism as well as it is structural and mechanical properties (Puxkandl et al., 2002; Malis, 2009), enables locomotion, facilitate movement and give skeletal stability (Screen et al., 2015). At the same time, all tendons play a positional act, positioning joints to ease movement, there are also those which must achieve as energy stores to allow for more efficient locomotion (Shepherd et al., 2014). The region where tendon, ligament or joint capsule attaches to bone known as An enthesis, that is an attachment site or insertion site. In the context of a tendon, it ensures that the contractile forces generated by the muscle belly are transferred to the skeleton (Benjamin et al., 2002; Bunker, 2014). The site of attachment of the tendon to bone or cartilage the tendon fibres radiate into the periosteum or the perichondrium and continue as so-called Sharpey-fibres inside the bone (Bragulla et al., 2004).

Tendons are forceful per unit than muscles and the tensile strength matches that of bone. The dry mass of a tendon is around 30% of the total tendon mass, with water calculating for the remaining 70%. Still, they are adaptable and somewhat extensible. Tendons depending on where they are located vary in shape, they can be rounded cords, strap-like bands or planted ribbons (Malis, 2009). The tendons themselves are consists of longitudinally arranged bundles of fibres . Fibers together with the tendon fibroblasts have formed the fascicles that bound well-adjusted by connective tissue sheaths to form a tendon (Zhang et al., 2005).

Collagen fibrillogenesis results in the assembly of fully grown collagen fibrils with a specific structure of tissue and capacity (Zhang et al., 2005). The extracellular matrix proteoglycans like decorin have been submitted to elevate the tensile properties of collagen and play a role in conducting and antagonise tensile stresses, namely facilitating fibrillar slippage at a time of tissue deformation (Robinson et al., 2004).

The collagen fibrils restricting high unidirectional tensional powers in tendons and ligaments, the collagen fibrils have a wide width and are less adaptable or more rigid than the small collagen fibrils opposing multidirectional strengths like those in the skin and vessel walls (Ottani et al., 2001; Ottani et al., 2002). The tendon crimping pattern changes when stretching forces are removed, recommending that crimps may also act like a withdrawing system after muscle relaxation in tendons or ensure joint stability at the time of stance in ligaments (Franchi et al., 2010).

2. 1. 3. 2. Tendon blood supply

The tendon blood supply is poor compared to muscles. However, the blood supply is important for the normal function of the tendon cells and the ability for tendons to repair (Malis, 2009).

The tendons get their blood supply from three principle sources. The intrinsic systems at the myotendinous (muscle-tendon) junction, osteotendinous (bone-tendon) junction and the extrinsic system through the paratenon or the synovial sheath. The measure of blood got from the diverse sources varies from tendon to tendon (Sharma and Maffulli, 2005).

2. 1. 3. 3. Function of healthy tendon

The mechanical function of healthy tendon is transforming muscular contractions into joint movement by transmitting powers from muscle to bone (Voleti et al., 2012). The tendons also action as springs, regulating strengths during motion, giving extra stability and a significant level of imperviousness to outer powers (Rodrigues, 2012b). Also, tendon inactively stores and discharges energy during a joint-loading cycle, bringing about more efficient movement (Voleti et al., 2012).

2. 2. Extremity Disorders In Neonatal Ruminants

2. 2. 1. Congenital flexor tendon contraction in newborns

The tendon disorders are the recognized reason for locomotory dysfunction in cattle, but the commonness of lameness that brought on by tendon damage is not clear. Tendon injuries creating a loss or diminished level of production result in the significant economic loss to the breeder (Yardimci et al., 2012). By the physical examination, the calf had diminished the range of motion (ROM) on extension (measured at 45° to 50°) of the carpal joints bilaterally. Ordinary range of motion on expansion on a standing straight leg is around 180° as measured on a normal addax in the herd. No skeletal abnormalities by radiographs of the forelimbs. The calf's limb abnormalities are credited to soft-tissue contracture (Watson et al., 2013).

The contracted flexor tendons are likely the most common abnormality of the musculoskeletal system of neonatal calves (Simon et al., 2010; Ochube et al., 2014). The most widely recognised deformity in contracted tendons are the regular defect in the cattle and happen in the various breeds which bring about the calf unable appropriately to extend its legs usually in the forelimb (Larson, 2010; Parrah, 2013). One study reported that muscle or tendon lesions represented 74% of upper limb injuries in the forelimb and 7.8% in the hindlimb (Anderson et al, 2008).

The tendon disorders may be congenital or acquired. Congenital flexed tendons (CFT) are usually primarily in the forelimbs and generally bilateral (Cockcroft, 2015). Congenital condition as autosomal recessive genes cause this abnormality that includes laxity, contracture, and tendons displacement (Ochube et al., 2014). Flexor tendon contracture is the most caused by the flexural limb deformity, the congenital limb anomaly mostly shown in dairy breed cattle, and congenital flexor tendon contraction commonly influences Fore-limbs usually bilateral and seldom acquired**.** Congenital flexural limb deformities frequently include the carpal or fetlock joints and range in severity from mild flexion of one joint to severe flexion of several joints. The deformity reflects a failure to accomplish or keep up the ordinary extension of the limb (Weaver et al., 2005; Yardimci et al., 2012).

The pastern, fetlock of the forelimbs and occasionally the carpal joints, at birth, are flexed to differing degrees because of shortening of the deep and superficial digital flexors and it is related muscles (Ochube et al., 2014). The old animals may be acquire contracted tendons in the limb following trauma, fracture or neurologic disorders (Cockcroft, 2015).

The newborn animals unable to stand and medical caretaker after a difficult parturition. The diminished range of motion (ROM) of the carpal joints is attributed to severe tendon contracture, possibly as a result of it is malposition in utero. Contracted flexor tendons have also been reported as a common typical inherent disfigurement of the musculoskeletal system in other ruminant species, such as cattle (Watson et al., 2013). The calves with various birth defects such as a cleft palate, arthrogryposis, dwarfism and spinal problems. In this manner, any calf with contracted tendons must be inspected closely to determine if it has a cleft palate or other defects. The calves with various deformities have a poor prognosis (Larson, 2010).

Within 1 or 2 weeks of birth, congenital contracted flexor tendon is a common defect in various breeds, shown most often flexion of the metacarpophalangeal or metatarsophalangeal joint. The deformity might be mild (if the calf is can stroll on the feet but the heels do not contact the ground), moderate (if the animal can stay remaining on the tip of the toe with the dorsal part of the hoof lying perpendicular to the ground, however, strolls on the dorsal part of the pastern, fetlock or carpus) or severe (if the influenced animal stands and strolls on the dorsal aspect of the pastern, fetlock or carpus) (Larson, 2010; Parrah et al., 2013; Ochube et al., 2014; Fazili et al., 2014). Severe flexural deformities are additionally joined by arthrogryposis, entanglement of collective limbs and severe carpal deformities. The animals with flexural distortions might be unable to the medical caretaker. Chronic deformity may cause the skin ulceration on the dorsum of the fetlock and in this manner, to septic arthritis (Fazili et al., 2014).

2. 2. 1. 1. Clinical finding

The congenital flexor tendon contraction is a typical deformity in cattle and happens in various breeds (Anderson et al., 2008). Metacarpo-phalangeal and/or metatarso-phalangeal joints and sometimes the carpal joint are contracted**.** In new-born calves, the deformity may happen with other congenital abnormalities the real risk to the calf is regularly be little. The affected calves are unable to rise and neglect to suckle enough colostrum with the failure of passive exchange of immunoglobulins. In this manner, influenced calves are at significantly higher danger of improvement of navel sick, polyarthritis and meningitis (Cockcroft, 2015).

Mildly influenced animals have slight carpal flexion with weight bearing on the tip of the claws and irregular knuckling of the forelimb fetlocks, then weight bearing on the dorsum of the fetlock. The cases that affected moderatly in the newborns can bear weight only on the flexed fetlocks. Progressive cases, with severe stability are recurrently recumbent most always in bilateral limb, the animal when pressed to stand tend to fall down quickly. Nonetheless some progressive bilateral cases stroll on the dorsum of the carpi which may cause of pressure sores and septic arthritis (Yardimci et al., 2012). Palpation make known excessive pressure and tautness in both the superficial flexor tendons (SFT) and/or deep flexor tendons (DFT) when attempt to straighten the leg. No pain is apparent on the extension, and missing joint swelling (Weaver et al., 2005). Contracted tendons may happen with other congenital abnormalities a complete physical examination should be performed on the calf (Anderson et al., 2008).

Mostly, supplement or colostrum admission is not adequate because the calves are unable to walk. If the calf has difficulty strolling must be colostrum administered orally or plasma administered intravenously. Adequate bedding is used to unless preventive measures are taken, fast abrasion of the skin can happen from repeated trauma (Anderson et al., 2008).

2. 2. 1. 2. Etiologic origin

The congenital flexor tendon contraction usually occure during gestation period due to feeding lupine plants to the dam (Cockcroft, 2015). Cattle, sheep, and to a lower extent horses locoweed poisoning are the most affected to the reproductive and chronic teratogenic effects**.** Contrary most teratogens may employ its effects on the mother's and the fetus at any time of pregnancy that causing a many of problems. These causes of reproductive problems are most similarly due to the connected effects of swainsonine of the pituitary gland affecting gonadotropin formulation, estrogen and progesterone equivalent that affecting by the ovary, also ovary affecting on the uterus and placenta, and directly to the fetus. Abortion, infertility, fetal deformity, and disturbances in placental circulation that work out in a massive collection of fluid in the uterus (hydrops uteri) (Knight and Walter, 2004).

Common newborn deformations experienced in domestic animals eating locoweeds incorporate twisted and deformed limbs coming about because of contracted flexor tendons of the legs, and abnormal advancement of the bones and joints. Found in the western U.S., the congenital defects are indistinguishable to those delivered by lupines, poison hemlock and individuals from the family Solanaceae for example, wild and developed tobacco. With huge calves, this condition might be brought about by positioning problems inside the uterus, that is legs held in a flexed position because of crowding (Larson, 2010; Cockcroft, 2015). Incorporate inherited factors, in utero nutrition, malposition, and the fetus being too extensive relative to the dam (Fazili et al., 2014).

2. 2. 1. 3. Treatment of flexural deformity

Successful treatment for flexural deformities depend on the site and severity of the deformity, the appropriate use of medical therapy, physical, and conceivable surgical therapy. After identifying of the problem treatment of congenital flexural deformities ought to be started soon, with the severity of the condition directing how treatment should proceed. As the animal gets older, the contracted tissues turn out to be less responsive to the treatment. Mild-to-moderate flexural deformities normally react to physical therapy with manual extending of the tendons during exercise (Anderson et al., 2008).

2. 2. 1. 4. Differential diagnosis

The diagnosis can simply be made by the abnormally observed flexed position of the affected limb (Fazili et al., 2014). Arthrogryposis, is one of the congenital anomalies reported in cattle. Arthrogryposis is a strong type of contraction in which numerous joints are inflexed (Prasad et al., 2010). Flexor tendon contraction can be differential diagnosis with arthrogryposis. Arthrogryposis influences the muscles, tendons, bones, and joint capsule. Ordinarily, an inherited condition that can influence unilateral or bilateral joints. Single deformities are uncommonly found in cattle. The different causes combine with intrauterine overcrowding (usually flexion), failure of lower motor neuron advancement, plant toxins, or teratogen like as arbovirus (Akabane). In the huge numbers of these cases, the bones are deformed, and there are no viable treatment options accessible (Prasad et al., 2010; Watson et al., 2013).

2. 2. 2. Fracture

The fracture is the dissolution of bones continuity with or without removal of the fragments. It is constantly joined by soft tissue that harm in many degrees, there are torn vessels, bruised muscles, lacerated periosteum and contused nerves. The most continuous cause of fractures is trauma (Alam et al., 2014). Data from domesticated animals insurance agencies proposes that around 10% of total cattle misfortunes are because of limb fractures (Desrochers et al., 2014).

The present investigations of genetic improvement for high meat and milk reproduction in cattle have a potential to bring about a relative discordance amongst dam and fetus, and this prompts to increase the dystocia issues. Commonly, inappropriate control or manual and mechanical powers by owners and some of the time veterinarians to help parturition. During excessive and forced traction process, the injury caused by utilizing material as a time of dystocia and/or inappropriately constrained extraction lead to fractures and disengagements with different soft tissue lesions in first metacarpus, metatarsus, mandible, femur, tibia, radius-ulna, humerus and ribs (Aksoy et al., 2009).

Metacarpal and metatarsal bone fractures are 50% of the bovine fractures. Extremity fractures are frequently seen in calves. The most common cause of metacarpal fractures in calves is excessive pulling forces during delivery (Öztaş and Avki, 2015). Excessive pulling forces on the forelimbs of a calf in the anterior presentation may bring about metacarpal fractures if a lever activity that connected to the forelimbs. Some other causes that may lead to metacarpal fractures are trauma due to falling on a concrete floor, hitting by different animals or moving objects (Arican et al., 2014; Belge et al., 2016). Depending on Görgül et al (2004) design that in different types and locations of fracture 31 cases, 25% fracture happened during force extraction of birth and 12.1% depending on the trauma.

In order of recurrence of long-bone fractures in calves, metacarpal fractures take the first rank (Belge et al., 2016). The most well-known fractures in cattle include those of the metacarpus (50%), metatarsus (50%), femur (14%) (Bilgili et al., 2008; Nichols et al., 2010; Rodrigues et al., 2012a), radius-ulna (7%) (Gorgul et al., 2004), while fractures of the phalanges are particularly uncommon (<1%) (Marchionatti et al., 2014; El-Shafaey et al., 2014). Comminuted fractures of the proximal phalanx are uncommon injuries in cows (El-Shafaey et al., 2014). Fracture of pelvic, proximal femur, axial skeleton, rib and mandible are rarer than the others in calves (Rasekh et al., 2011; Hoerdemann et al., 2012). In the calves, metacarpal fractures happen frequently in the distal epiphysis and metaphysis. In the investigation of newborn calves, 12 of 33 cases of metacarpal fractures (36.4%) are situated in the distal metaphysis of the fact that the cortex becomes markedly lighter at the transition from diaphysis to metaphysis, this area of the metacarpus has just restricted axial force**.** The most metacarpal fractures in newborn calves are the transverse fractures (Belge et al., 2016). The calves with the fractures have to based on the recession and unlike of appetite. The calves unable to move, walk or stand on their feet might not have any desire to stay in a position that is most comfortable to resting and hence favored. X-ray (radiograph) gives important data for fracture bone diagnosis, healing, and prognosis of critical information. In different positions specifically taken from lateromedial and caudocranial positions (Ewoldt et al., 2003).

2. 2. 2. 1. The decision to treat a fracture

The fracture management concentrates primarily on the restoration of capacity and physical integrity with the littlest deformity of bone. Different internal and external techniques might be used to fix long-bone fractures in calves. For the fracture treatment many methods are used such as transfixation pinning, coaptation cast, intramedullary pinning, bone plates and intra fragmental compression screws. The decision of implant materials and the techniques of using them are prime factors as a part of the rebuilding of progression and practical quality to the fractured bone during the healing process (Alam et al., 2014). In the animal that raises for meat the treatment is expensive and achievement rate is high. The potential economic or genetic value of the animal, weight, type, and area of fracture and experience of the veterinarian (Jean and Anderson, 2014; El-Shafaey et al., 2014).

The surgical treatment is alternatives for bovine long-bone fractures most of the time metacarpal fractures have been described overwhelmingly in calves and young cattle (Belge et al., 2016). In farm animals, for an external lessening of closed fractures have been as often as possible used the treatment decision like as the bandaging technique supported with some materials such as polyvinylchloride (PVC) and the splinting such as Thomas splint alone or joined with a bandage. The transfixation pinning and casting methods are additionally used particularly as a part of the lessening and fixation of fractures of metacarpus/metatarsus, tibia, and radius ulna. The internal fixation techniques applied by using some materials such as cerclage wiring, intramedullary pinning, screw, dynamic compression plate (DCP), interlocking pin are prescribed especially in decrease of the dislocated, divided and complicated fractures or in the fractures set up in bones not appropriate for bandaging or splinting (Aksoy et al., 2009).

Metacarpal fracture immobilization has been giving most ordinarily with external cooptation, transfixation pins with or without the use of casts, or internal fixation (Alam et al., 2014). The specialty of stabilizing fracture fragments is necessary for modern surgery and orthopedic surgery has expanded in various terms of stabilizing materials or implants (Belge et al., 2016). The accessible writing lacks definite information about prevalence and characterization of fractures in calves. Ruminant orthopedics is ineffectively seen so far in view of an absence of extensive studies on fracture (Alam et al., 2014).

2. 2. 3. Bow-leg and knock-knee

The minerals constitute in body tissues and liquids of adult animals originate basically from exogenous sources and constitute around 4% of the animal's body weight. Minerals are for the most part isolated into macroelements with focuses higher than 50 mg/kg BW (body weight) and trace elements or microelements with focuses beneath 50 mg/kg BW. In 1981, a list of 22 elements essential to animal life was produced. It included 7 macroelements: calcium, phosphorus, magnesium, chloride, potassium, sodium, sulphur, and 15 microelements: copper, iron, zinc, silicon, iodine, selenium, manganese, cobalt, molybdenum, nickel, tin, fluoride, chromium, vanadium, and arsenic (Radwinska and Zarczynska, 2014).

The calcium (Ca) is the most abundant mineral in the body, and 99% of the calcium found in bones. The phosphorus (P) is the second most abundant mineral in animals body, about 80% of this element that situated in bones and teeth. In ossification processes, phosphorus works together with calcium. Vitamin D3 is responsible for regulating calcium and phosphorus levels in the body with parathormone and calcitonin (Sobiech et al., 2010). The phosphorus deficiency, which maybe exacerbated by low vitamin D levels, adds to changes in the skeletal system and in young animals evolution of rickets (Radwinska and Zarczynska, 2014). The characteristics of rickets are comparable in all species. The clinical signs of rickets in sheep involve lameness, stiff gait, enlarged joints (especially, the radiocarpal), bowed legs, and poor weight. In the fastest-developing bones the lesions are normally most severe including the radius, tibia, metacarpals and metatarsals (Dittmer and Thompson, 2011). Phosphorus insufficiency which may be compound by low vitamin D levels adds to changes in the skeletal system and the progress of rickets in energetic animals (Radwinska and Zarczynska, 2014).

Most cases in local animals are brought on by the dietary inadequacy of either vitamin D or phosphorus, but periodic inherited forms are recorded. Vitamin D deficiency in most cases results from a poor diet and inadequate presentation to daylight. Clinical recovery occur within 6 months when the dietary phosphorus insufficiency is corrected (Dittmer and Thompson, 2011; Radwinska and Zarczynska, 2014). Cattle are more sensitive to phosphorus deficiency than sheep (Dittmer and Thompson, 2010). Defective bone mineralization joined by inhibited necrosis of cartilaginous cells and osteoblast entrance induce the loss of bone elasticity and bone deformation. Another result of phosphorus deficiency is the compensatory multiplication of cartilaginous tissue and inhibited bone prolongation (Kurland et al., 2007).

The earliest characteristics of rickets are inhibited development and allotriophagy. Also in animals, rickets may result in lameness, the curvature of legs, impaired mobility and recumbence (Dittmer and Thompson, 2010). The clinical signs of vitamin D insufficiency are bowed long bones, shortened, and deformed, the knees can be either bow-legged or knock-kneed. Nonetheless, these are drastic changes and just happen when the individual is experiencing serious vitamin D lacking. Extremely slight bowing of the long bones as probable rickets and moderate bowing or a higher degree of bowing as distinct rickets (Ziesemer, 2013).

The front legs of the cows must be straight when seen from in front. A vertical line may be drawn from the point of the shoulder to the center of the claw. This line should cross the knee. As the knee joints bear more than half the cow’s body weight, deviations from this line may bring more wearing of these joints. A ‘knock-kneed’ caws may have turned-out front feet. Cattle, when the knee joints lie inside this line, is considered ‘knock-kneed’, which may at last lead to overgrown outside claws. That is wide at the knees bow-legged presents a more major issue. These animals are regularly narrow in their position and may roll their feet when they walk (Figure 1). They can likewise be wide on their shoulders. A more difficult problem happens where the legs are wide at the hocks bow-legged, but the feet are turned in. Additional strain is put on the ligaments of the hock joints creating lameness and even forever damage (Cumming, 1999). Turned in knees (bow legged) causes the stock to roll their feet and these animals are recumbent to arthritis. All proportions ought to be adjusted for calcium, phosphorous for good bone wellbeing. Other supportive minerals for foot wellbeing are molybdenum, copper, manganese, and zinc (Ashood, 2011).

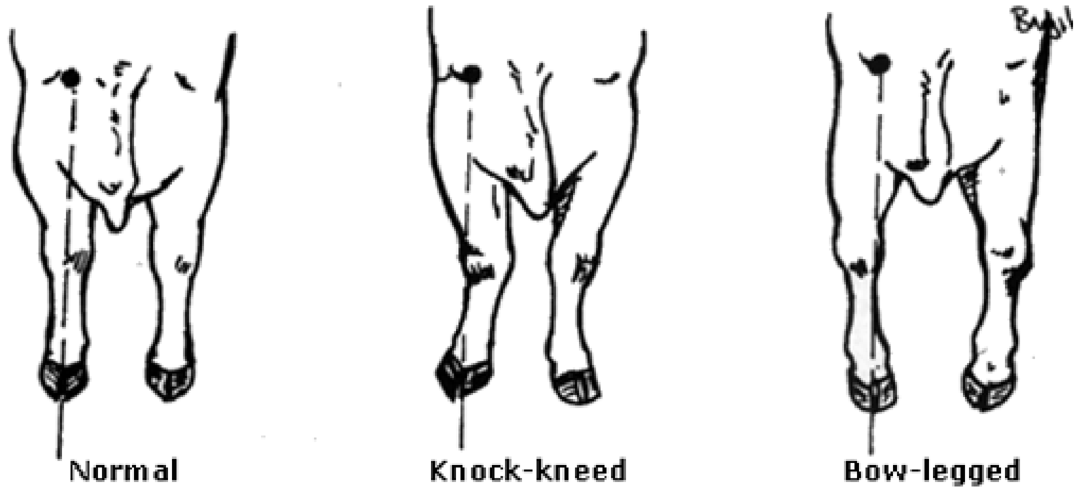

Figure 1. The picture shows bow-leg and knock-knee in the calf (Raza et al., 2013).

3. MATERIAL AND METHODS

This study, permission were taken from Veterinary Faculty of Yuzuncu Yil University.This study was performed on the neonatal ruminants that brought by rural owners for treatment to the veterinary hospital during 6 months from February to July in 2016. The all suspected cases were examined and taking the history, clinical signs and radiography for that suggestion of newborn ruminant extremity (limb) deformity. The information about all affected animals breed, age, weight, sex, birth, type of deformity, and duration between the affected was recorded. Overall (33) of newborn ruminant that brought to the veterinary hospital, their ages were between (1- 60) days, that 25 of them were calves, 7 of them were lambs and one of them was the kid. The female calves were seven while 26 of them were male. The breeds of all the calves were Simmental except two calves that were local black. All the deformities information were recorded for each case that consist of (congenital flexor tendon contraction, fracture, deformity from the shape of limbs bowlegs (O shape) and knock knees (X shape).

The most abnormality that recorded were congenital flexor tendon contraction in the total numbers were 28 newborn ruminants which 21 of them were calves (16 male, 5 female), 6 of them lambs (5 male and 1 female) and one of them was the male kid. The deformity in all affected newborn were in the forelimb and hind limb the more abnormalities in the forelimb bilaterally. The two male calves had the fracture, one of them the fracture was on the right side of the metacarpal bone, while another one the fracture was in the right metacarpal epiphysis. The deformity cases of bowlegs (O shape) and knock knees (X shape) were 2 male calves and one female lamb (table 1).

3. 1. Congenital Flexor Tendon Contraction

The neonatal animals were diagnosed by clinical examination of all the limbs joint carefully during motion. The calves limbs were exposed to radiographic images craniocaudal and mediolateral. The congenital flexor tendon contraction was detected in (28) cases of newborn ruminants, 21 calves (75%) that 16 of them male and 5 female the majority breeds of them were 19 Simmental and two local black, 6 lambs (21.42%)

were 5 male and one of them female. All deformities in both limbs, forelimb from carpal joint and/or fetlock joint, deformity existed in the hind limb in hock joint and /or fetlock joint (Table 2) and (1) male kid (3.57%) it was severe deformity from the carpal joint.

Table 1. The total numbers of newborn ruminants extremity disorders and deformity.

Extremity deformities	Calves		kids		Lambs		Summation
	Male	Female	Male	Female	Male	Female	
Flexor tendon contraction	16	5	1	-	5	1	28
Fracture	2	-	-	-	-	-	2
O shape limb	1	-	-	-	-	-	1
X shape limb	1	-	-	-	-	1	2
Summation	20	5	1	-	5	2	33

The congenital flexor tendon contraction deformity was more often in the males than in females, and more often in the forelimbs than in the hind limbs. In the forelimbs 20 cases were involved, 7 cases in the hind limbs and 1 calf the forelimbs and hind limbs were affected. From all the animals that were recorded of flexor tendon contraction 13 of the newborns were bilaterally affected. In this study, one male calf of the local black breed with congenital flexor tendon abnormality had another congenital abnormality that was atresia ani.

Flexural deformities were classified as follows:

Mild: The newborn is able to walk on their claw tip, but the heels do not contact the ground (Adams and Santschi, 2000; Fazili and Syed, 2003) (Figure 2).

Moderate: The dorsal aspect of the hoof breaks over a vertical plane perpendicular to the ground (Anderson et al., 2008).

Severe: The affected animals are usually recumbent (always in bilateral cases) and move on the dorsal aspect of the carpus when forced to walk (Yardimci et al., 2012; Parrah et al., 2013) (Figure 3).

Figure 2. The newborn calf with mild flexor tendon contraction in fetlock joint.

Figure 3. The newborn calf with sever flexor tendon contraction in fetlock joint that bilateral forelimb.

When the affected newborn ruminants were examining with flexural limb deformities, it was important to discover that the newborns can stand without helping or not. If the newborn ruminants can stand, particular therapy for flexural limb deformities is frequently unnecessary. The newborns cases were affected mildly were 9 cases that 7 of them calves and 2 of them lambs. In the 7 cases by unilateral were affected while in the 2 cases were bilateral. Mild flexural deformities commonly respond to physical therapy with manual stretching of the tendons at the time of exercise. The newborn were exercised manually for about 10 days. The purpose of the exercising animals was to help lengthen or stretch the palmar or plantar soft tissues. The moderate cases were 14 cases that 11 of them were calves and 3 of them were lambs, which 5 cases were unilateral, 8 of them were bilateral and one calf all of the limbs were affected moderately from fetlock joint.

3. 1. 1. Treatment of newborn by bandage and splint

The moderate and severe cases of congenital flexor tendon contraction were treated by bandage, splint, and vitamins (AD3E and multivitamins), except one severe case that treated by surgery. The newborns that can stand on the limb with fetlock joint knuckled forward. The limbs were applied splinted for extending the fetlock joint and to load on the flexor tendons. If the calves could not stand on the foot, splinting the limb in extension were need to allow the calve's body weight to load and expansion the tendons and palmar soft tissues. The splints were applied for 7 days to force the animal to take weight on their toes. If necessary the splint was applying again after the first week of treatment.

Table 2. The numbers of newborns (calves, lambs, and kid) forelimb and hind limb joints deformity and classified by severity, except only one calf that had all limbs deformity of fetlock joint moderately that no mention in this table.

Flexor contraction	Classified	Forelimb			Hind limb			Summation
		Right	Left	Bilateral	Right	Left	Bilateral	
Carpal joint or hock joint	Mild	-	1	1	-	-	-	2
	Moderate	-	-	1	-	-	-	1
	Severe	-	-	1	-	1	-	2
Fetlock joint	Mild	2	1	1	1	2	-	7
	Moderate	2	1	7	1	1	-	12
	Severe	-	-	2	-	1	-	3
Summation		4	3	13	2	5	-	27

The splints should be applied cautiously as they can easily pressure sores due to the weakness of the integument and the pressure that is sometimes needed to extend the limb. Any strong, light material is suitable for a splint. However, in this study used polyvinylchloride (PVC) pipe was readily available and simply cut by miter saw and a plastic pipe cutter and shaped to the required size. For newborn, 4-inch diameter thick-walled pipe, cut into a one-third or half semi-tubular shape was applied. The ends of the splint were covered by plaster. Before applying a splint, bandages should be placed over the entire limb, the limb was covered by three layers of sheet cotton until olecranon tuber or calcaneal tuber then bandaged amply, padded with roll cotton and then splint was positioned over this bandage on the palmar or plantar aspect of the limb then tightened the splint with the bandage and covered all limb by plaster to protect limb to not get wet and dirty (Figure 4).

Figure 4. The affected calf with congenital flexor tendon contraction X-ray for calf forelimbs without any abnormality in the bone (A) and applying bandaging (B), (C) and splint on calves limbs, finishing bandaging and splint calf stand on it limbs (D).

This relaxation also can be completely fixed by tension or stretching produced by splints in neonatal ruminants deformities with moderate-to-severe contractual. The severe cases were 5 cases, 3 of them were calves, 1 lamb, and 1 kid that 2 cases were unilateral and 3 cases bilateral. The splint used for treating severe deformities and surgical treatment for a kid tenotomy. Weekly splints can be changed and the leg examined. If re-application of the splints was necessary, the limb was un-splinted for several hours before the splints were applied again (Figure 5).

(A) **(B)**

Figure 5. Radiography of calf's forelimbs was severely affected congenital flexor tendon contraction, showed normal bone (A) right, and (B) left fetlock joint.


(A)


(B)

Figure 6. The newborn calf 3 days in age, affected bilateral forelimb with severe congenital flexor tendon contraction, before applying bandage and PVC splint (A) and after applying (B).

The straight splints were used in the severe deformity. When the deformity progress, a curved can be placed in the splint at the point of the fetlock joint to increase force on this joint to extend it. The splints can be curved easily by notching each side of the PVC splint by heating it over a flame. Cooling the splint to harden off the splint. Discontinued use of the splints when joint angles approach normal and the calf can stand without an assistant. We advised the owners to help the animal to stand and suckling. They were also directed to monitor the proper position of the splint and controlled exercise will usually result in complete correction of the deformity.

3. 1. 2. Surgical treatment

One of the severe case was treated by performing tenotomy that fail to respond to other therapy and PVC splint applied. In this study 30 days in age, 5000 gm/kg body weight male kid, after X-ray were taking for left limb. The case diagnosed that not have any deformity in the leg bones and joint. After physical examination a deformity had in the soft tissue of the leg that flexor tendon affected. The severe congenital flexor tendon contraction in it carpal joint and needed tenotomy for flexor carpi ulnaris and flexor carpi radialis to treatment tendon deformity.

Preparing animal for surgery by, properly shaving of the left forelimb from elbow angle until distal part of limb hoof area, and disinfected area by iodine and alcohol as antiseptic. The kid was deeply sedated with general anaesthesia given Xylazine at a dose of (0.2 mg/kg/IM), lidocaine at a dose of (2 mg/kg) as a muscle relaxant sedative respectively (Figure 7).

The longitudinal incision were made by the scalpel for about 8cm on the lateral aspect of the radius bone and the incision was 4cm above the carpal joint**.** After the skin and facial incision then detected and took flexor carpi ulnaris and flexor carpi radialis from lateral of radius bone by hemostatic forceps cute it by scalpel Z-shape then sutured both of them by cutgut absorbable suture material (USP 2/0, 1.5m) round body suture needle then sutured inner part of fascia by same suture material, sutured by simple continuous technique. After that the skin sutured by simple interrupted suture technique through silk (non-capillary, non-absorbable, black, USP 1, 4m). In the last bandaging and splinting of the limb for 2 weeks might be required postoperatively (Figure 8).

(A)   (B)

(C) 

Figure 7. The kid in 30 days in age, left forelimb had severe congenital flexor tendon contraction (A), shaving of the left forelimb preparing for surgery (B) and radiography for left forelimb (C).

After 2 weeks of surgery repeated the bandage and splint from the prominences bony of accessory carpal bone, styloid process of ulna, and tuber olecranon were covered by layers of cotton was well padded to avoid skin necrosis at potential pressure sores during applying splint for let the tendon tissue healing correctly and give small force to stretch congenital contracted tendon. The owner was advised to make a special place for kid that clean and not let it move more. After 2 weeks opened the bandage removed stitches and applied bandage for 7 days again.

Figure 8. Tenotomy of both flexor tendons flexor carpi ulnaris and flexor carpi radialis performed for the kid, then suturing the inner part of fascia and skin, at last, apply bandage and splint for the affected limb.

3. 2. Fracture

The fracture was depending on to the clinical findings. History was taken from the owners, clinical examination, and radiological examinations were done for calves limbs. Radiographs were taken in dorsopalmar and lateromedial. 2 male Simmental calves with a transversal unilateral closed fracture. The first one was newly born and only one day-old. The newly born calf had fracture from right metacarpal bone that happened due to forcing by the owner on the limb during parturition. Signs of swelling and mild propagate pain were response to palpation of the distal metacarpal region. This case was treated by cast technique on the full limb, cast was applied for 3 weeks. Figure 9. Another calf 30 days-old had right limb transversal fracture from the distal epiphysis of metacarpal bone.

(A)

(B)

Figure 9. Photograph and radiograph dorso-palmar view of the (A) metacarpus of the calf 1-day-old showing transversal fracture distal epiphysis, (B) treated by cast technique a full limb cast.

3. 2. 1. Surgical treatment

The surgical treatment were performing in one male calf that age 30 days, in this case the fracture were from distal epiphysis of metacarpal. The calf was clinically evaluated by walking and resting for subjective assessment of clinical signs, visual and palpable abnormalities of the right forelimb (Figure 10).

Figure 10. Photograph and radiograph dorsopalmar view of the metacarpus of the calf 30-day-old showing transversal fracture distal epiphysis of right forelimb.

The operative treatment was done by putting T shape locking compression plate (LCP) fixation that was the best implant of choice for this cases of the additional metacarpal distal epiphysis. The calf was placed in lateral recumbency, upward the affected right forelimb. The calf was general anesthetized by xylazine hydrochloride (0.2 mg/kg, IM) and ketamine hydrochloride (2.2 mg/kg IM). Prepared the leg for surgery the leg was clipped, shaved and aseptic the limb area by iodine and alcohol as antiseptic. Part of the affected limb above the hoof and carpal joint was covered with sterilized gauze. All the calf's body was covered with sterilized covers, except the operation site of the limb. On the dorsal surface of the metacarpus was made the incision on the skin of fracture part. The fractured area was reached by blunt dissection of subcutaneous tissues. The limb was placed and the fractured bone was positioned. The fractures part was replaced to correct position by dissector. The T shape the locking compression plate (LCP) fixation was placed on the cranial/dorsal surface of the metacarpal fracture bones. Screw 6 nails from locking compression plate (LCP) to the sides of fracture bone. With normal saline the region was washed to checked for the bleeding. By simple continuous sutures were closed subcutaneous tissues with polyglactin (USP 1-2m), the skin was closed with simple interrupted sutures using silk (noncapillary, nonabsorbable, black, USP 1, 4m), and the operation process was completed. X-ray images were taken for postoperative control (Figure 11).

Figure 11. These pictures show of bone fragments, and time application of LCP at the time of surgery, and radiographical picture after application of the LCP.

After surgery, the owner advised to take care of the calf in confined calf hutch. For the purpose of preventing possible infections, antibiotics (amoxicillin-clavulanic acid, 9 mg/kg IM, daily for 7 days). The relevant leg was supported by a synthetic acrylic plaster bandage for 14 days. In this period, calves were kept under control.

3. 3. Bow-Leg And Knock-Knee

The bow-leg and knock knee are other extremity deformities in the neonatals ruminants. In this study 3 cases were have this condition. That one male calf was shown bow-leg (O shape) and one male calf , one female lamb were shown knock knees (X shape). Figure 12, Figure 13. After clinical examination of all the extremity limbs carefully during motion. The newborns were treated by Vitamin D and notify the owners to let animals under sunlight.

Figure 12. The newborn calf with bow-leg in the hind limb.

Figure 13. The newborn calf with knock-knee in the forelimb.

4. RESULTS

In this study thirty-three 33 newborns ruminants were recorded for extremities deformities. The newborns ruminants were in age from one day to 60 days that 25 of them calves, 7 lambs, and one kid. The affected newborns females were seven and 26 of them were males. The breeds of all calves that affected were simmental except two of them local black. The extremity deformities were included congenital flexor tendon contraction, fracture, and deformity bowlegs limbs (O shape) and knock knees (X shape).

4. 1. Congenital Flexor Tendon Contraction

The congenital flexor tendon contraction deformity were founded in 28 cases neonatals ruminants which 21 of them calves, 6 lambs and one kid. The deformity from forelimb and hind limb were more abnormalities in the forelimb bilaterally. The forelimbs were involved in 20 cases (71.42%), hind limbs 7 cases (25%) and 1 (3.57%) calf the deformity shown in both forelimbs and hind limbs. Thirteen (46.42%) of the newborns was bilaterally affected from all the animals that were recorded and 15 cases (53.57%) unilaterally were affected.

The newborns were affected mildly 9 (32.14%) cases, 7 of them were calves, 2 lambs. The newborns were unilaterally affected shown in 7 cases and 2 cases of them were bilateral. The influenced neonatals mildly controlled by exercise for 2 weeks. The moderate cases 14 were 5 cases unilateral, 8 bilateral and one calf was all of the limbs was affected moderately. All the cases were treated by using a bandage, splint, and vitamins (AD3E and multivitamins). The severe cases were 5 newborns animals, 2 cases of them were unilateral and 3 cases of them bilateral. The treatment for the severe affected kid flexor tendon contraction was done by using tenotomy and\or splint for correcting that contraction. The mild cases, controlled by exercise that first time in clinic and to the show to the owner to repeat it at home for 1 week to the affected newborns. Seven cases of them were treated after 1 week by exercise, while 2 cases were remaining the deformity after 1 week of exercise so repeated exercise for them 1 more week leading to treated the deformity (Table 3, Figure 14).

The moderate affected cases were 14 (50%), after applied splint and bandage for limbs of affected newborn moderately treated 2 cases of them in the first week, after that repeated splint and bandage for remained 12 newborns for next week. After 2 weeks all the cases had controlled the deformity.

Figure 14. The calf treated bilateral forelimb mild deformity after 2 weeks applying of bandaging and splint.

Figure 15. The calf treated severe bilateral forelimb deformity after 3 weeks applying of bandaging and splint.

The severe cases, those 5 (17.85%) cases that affected severely, the splint and bandage straightly used for 4 cases of them, while tenotomy used for one kid. Two cases that severely affected treated after applied splint and bandage were needed 3 weeks which changed 3 times separately in 3 weeks that renew all weeks. Figure 15. The another 2 cases were remained this deformity after 3 times in 3 weeks applied the splint and bandage the deformity no resolved. The 2 cases were calf and lamb had the severe deformity. The calf limb contraction was complicated that owners did not take care about clean the place of the calf, the bandage were wet and contaminated bandage with faeces, urine, and dirt after the second week come back to clinic. The affected limb causes arthritis in hock joint and fetlock joint, also some place of limbs skin had wound and limb effortlessly hair loss by hand, that treated by administrated antibiotic and analgesic for arthritis (Oxytetracycline 5 ml, IM, continued for 2 days, Meloxicam 1ml (20gm/kg) , IM, continued for four days). In third-week arthritis and wound healed was achieved in both cases but the newborn still not used contracted limb. The lamb had congenital flexor tendon contraction in forelimb bilaterally on a carpal joint at the first week of comes to the clinic were applied splint and bandage for 3 weeks and renewed to controlled the deformity every week. After the 3 weeks from the initial application, the lamb limbs not resolved.

The surgery were made for the kid that had congenital flexor tendon contraction in the limb that unable to wolk on the carpal joint of left forelimb. After two weeks of the surgery the bandage removed from the limb the stitches the surgical wound healing were achieved and renewed bandage and splint for 1 week. Applied again bandaging and a splint for the limb 2 weeks again. After one month the kid was resolve deformity used the limb and walked on it with little lameness and no need bandage and splint anymore only need to do exercise by the owner for the limb. At last, after 45 days the kid limb was treated and not have any more lameness (Figure 16).

(A) (C)

(B) (D)

Figure 16. The kid left fetlock joint severe congenital flexor tendon contraction (A) first time in a clinic before surgery, (B) after 14 days of surgery, (C) renewed bandage and splint after 14 days of surgery, (D) after 45 days kid without deformity in a limb.

Table 3. Table of treatment of congenital flexor tendon contraction in all cases newborn ruminants.

Deformity degree and number of cases	Weeks to treated the deformity				Resolved deformity
	First	Second	Third	Fourth and more weeks	
Mild 9 cases	2	7	-	-	Resolved all deformity by exercise.
Moderate 14 cases	2	12	-	-	Resolved all deformity cases by bandaging and splint.
Severe 5 cases	-	-	2	1 kid treated after 6 weeks	Resolved 2 cases by bandaging and splint, and 1 kid by tenotomy, but remain deformity in 2 cases that applied bandage and split.

4. 2. Fracture

The fracture that in two newly born males calves, the fracture were from the limb in the metacarpal. After diagnosing of fracture by clinical findings and history taken from the owners, clinical examination, and radiological examinations. The calf was only one day in age that fracture from right metacarpal bone that happened by owner forceful on the limb during parturition. The calf was treated by applied full limb cast for 3 weeks, after three weeks later calf can stand but have little lameness. After 5 weeks from treatment resolved lameness of the calf leg and can walk normally without lameness. Another case male calf 30 days in age had the fracture from right metacarpal epiphysis. This case was treated by surgery that operative treatment by plate fixation of the limb. The owner advised to take care of the calf in the clean place and not lead to contaminate the limb and coming back again to the clinic after 4 weeks to remove the bandage and stitches. after the 4 weeks of surgery the owner didnot come back because the village of them was so far away that he could not come to clinic easily, after 45 days the owner say by a phone call that the calf was fine.

4. 3. Bow-Leg And Knock-Knee

The other extremity deformity like deformity from the shape of limbs (O shape) or (X shape). That the 3 cases had the deformity shape of limbs were the bowlegs (O shape) 1 male calf and knock knees (X shape) that 1 male calf and 1 female lamb. The newborns cases were treated by Vitamin D and notify the owners to let animals under sunlight. The female lamb and two calves that deformity of the limb shapes when to stand and walked were resolved limbs deformity can walk normally that treated by vitamin D and the owner let it under sunlight daily.

5. DISCUSSION

The contracted flexor tendons are probably the most pervasive anomaly of the musculoskeletal system of the newborn calves (Encarta, 2000; Ochube et al., 2014). Congenital flexor tendon contracted is a typical defect in cattle and happens in various breeds and flexural distortions predominantly are found around the carpus or fetlock (Anderson et al., 2008). Etiologic origins for contracted flexor tendons consist of inherited factors, in utero malpositioning, overcrowding brought about by the size of the fetus relative to the dam (Yardimci et al., 2012; Parrah, 2013) and exposure to teratogens have been recommended as reasons for congenital flexural limb deformities (Adams and Santschi, 2000). Tendon deformities causes of loss of a production animal or a diminished level of production that in significant economic misfortune to the cattle producer (Anderson et al., 2008).

The extremity deformity in this study that had recorded 33 of newborn ruminant their ages between (1- 60) days was 25 of them calves which breeds of the calves was 23 Simmental and only 2 cases local black, 7 lambs, and one kid. Seven of newborn were female (33.33%) and 26 were male (78.78%). Congenital flexor tendon contraction were in 28 newborn ruminants 21 calves (75%) were 16 male, 5 female, 6 lambs (21.42%) were 5 male and 1 female and had (1) male kid (3.57%) that all deformities in both limbs, forelimb from carpal joint and/or fetlock joint, in the hind limb in hock joint and /or fetlock joint.

The congenital anomalies have been evaluated to happen in 0. 2% to 5. 0% of calves (Saperstein, 2002; Distl and Bahr, 2005). In humans and animals discovered distortions of the distal limbs are among the most progressive congenital anomalies (Fazili and Syed, 2003; Talamillo et al., 2005). It has been reported in Kashmir of the total 361 that 6.37% cattle exhibited for treatment incorporated of congenital abnormalities (Fazili and Syed, 2003).

Previous retrospective examinations of congenital anomalies in newborn calves have been represented, two of which were done in the same geographic zone as the present study. As per Aksoy et al (2006) and Yardimci et al (2012) after abdominal wall anomalies, limb deformities were the second most common congenital abnormalities. Curiously, in both investigations, that a remarkable male dominance (2.5:1and 5.5: 1) additionally, was reported as in the present study recorded the same ratio for male to female that affected (5.5:1.5). Presents studies had shown the congenital flexor tendon contraction may happen with other congenital abnormalities, such as cleft palate, dwarfism, and arthrogryposis (Anderson et al., 2008; Parrah, 2013) also, in present study was had the other congenital abnormality with flexor contracted tendon in 1 male calf that was Atresia ani.

From India, that reported in all the animals suffering from the contracted flexors tendon both the forelimbs were included. Flexural abnormalities in every one of the cases were present around fetlock. Hind limbs were not included in any of the animals. Congenital flexed tendons (CFT) are usually basically in the forelegs and generally bilateral (Weaver et al., 2005). As recorded from the present study was detection from 28 of all cases had congenital flexor tendon contraction deformity more in forelimbs than in the hind limbs, in forelimbs were involved in 20 cases, hind limbs in 7 cases and 1 calf that all limbs was affected. Thirteen (13) of the newborns that had affected in forelimb was bilaterally from all the animals that were recorded.

The congenital flexural deformities depending on the severity of the case had vary alternatives treatment options. Weaver (2005) and Anderson et al (2008) that were reported physical therapy with manual extending of the tendons as exercise empowers progressive remedy of the milder cases of flexion of carpus joint and fetlock joint. Sach as present study,mild congenital flexor tendon contraction have responce to daily manual exercise to the limb of affected animals. That 9 cases mildly afeccted congenital flexor tendon contraction were 7 newborns treated after one week of exercise, and remains 2 newborns were treated after two weeks of exercise.

Fazili et al. (2014) that in mild case consider prolongation of claw toes with piece of wood glued to sole or used methyl methacrylate acrylic and a dainty wooden block to increase the pressure on the contracted tendons during exercise, bandage, splint select lightweight splint material such as PVC, or cast applications can be utilized for mild to moderate cases in more severe case firstly correct any systemic problem and then consider applying splint on palmar part of limb, bandage the limb before applicable splint. Lightcast the limb otherwise over padding, ensuring its simple expulsion for examination after one to two weeks. As the animal gets older, the contracted tissues turn out to be less responsive. The motivation behind of splints use is to adjust the limb so that the animal's body weight can extend the tight tendons and ligaments, PVC is more generally used than wooden splints. Good quality PVC piping is not only light but also has a curved inner surface that fits well to the form of the limb. In this study used PVC splint and bandage for resolved of moderat to severe cases affected by congenital flexor tendon contraction. Applied PVC for 14 moderate cases which resolve deformity in 2 newborn cases after one week and in 12 cases after two weeks. In severe cases that used PVC splint and bandage for 4 cases treated 2 cases after three weeks of applied and renewal splin and bandaging weekly two newborns were remain the deformity after this time.

Later study Adams and Santschi (2000) considered that specific physical therapy for treatment flexural limb deformities in the foal. Daily controlled exercise the foal that can stand turnout in a little enclosure with her mother for 60 minutes. The deformity was recuperated following 2 weeks of exercise. However, apply splinting to the limb if the foal cannot stand in extension is important to permit the foal's body weight to load and extend the tendons and palmar soft tissues.

Additionally, Adams and Santschi (2000) utilized corrective shoeing for congenital flexural deformities is commonly confined to applying for toe extensions. Toe extensions most imperative in instances of distal interphalangeal joint flexural deformations. Toe extensions are often utilized because can be difficult to keep on the foot of the foal.

Latest study Parrah (2013) in India, was reported contracted flexor tendons were treated with Z tenotomy. Additionally, such as Weaver (2005) reported in severe cases congenital flexed tendons (CFT) of fetlock and carpal flexion surgical correction may be an attempt. Fortunately, the present study was recorded resolved of a kid limb that has severe congenital flexor tendon contraction (CFT) from the carpal joint in left forelimb after 5 weeks of surgery. Applied splint for it limb after two weeks of surgery covered limb by layers of cotton was well padded to avoid of skin necrosis at potential pressure sores during applying splint for 1 week then repeat for two weeks again until treated and the owner did exercise for it after removed the splint.

Later study Fazili et al (2014) used wooden or polyvinyl chloride (PVC) splint connected to the palmar or plantar part of the affected limbs. The majority of the animals were haphazardly allocated to two equal groups. Calves of Group I moreover received oxytetracycline (20 mg/kg intravenously daily for 3 days). The animals of Group II no received medication. The condition determined tastefully in 83. 3% and 80.0% calves from the two groups, consequently. It consisted that bilateral moderate fetlock knuckling in the newborn dairy calves can be overseen acceptably with early application of splints. Supplementary utilization of oxytetracycline at repeated doses of low-toxicity had just an insignificantly beneficial impact.

The latest study, Yardimci et al. (2014) in Samsun, Turkey used a novel technique for the treatment of severe congenital flexural forelimb deformities in calves. A semicircular external skeletal fixation system (SESFS) made out of 6-hole, 45° carbon-fiber arches, 6 mm hexagonal nuts, 6 mm strung poles, half-pin fixation bolts, and negative profile and threaded half-pins. The most widely recognized entanglement was pin tract release during the healing time. Three cases advanced pin tract drainage and Staphylococcus epidermis were detached from the microbial cultures. Time amongst surgery and fixator expulsion ranged from 25 to 36 days. There was no bandage application or exercise limitation performed in any of the calves taking after fixator removal**.** In present study resolved all the cases that mildly and moderatly affected congenital flexor tendon contraction, but in severe congenital flexor tendon contraction cases from the 5 cases that 2 cases not resolved the deformity and complicated the deformity that owners do not toke care about clean the place of the calf, bandage was wetted and contaminated bandage with faeces, urine, and dirt after the second week come back to clinic, affected limb causes arthritis in hock joint and fetlock joint some place of limbs skin had wound and limb effortlessly hair loss by hand. All calves were raised until they reached ideal weight for slaughtering. Because of the potential genetic etiology of the deformities, the owners were warned to not utilize these cattle as broodstock.

The fracture was commonly the caused by mechanical pull force at time of fetus in the birth canal during birth (Aksoy et al., 2009; Arican et al., 2014). In this study was one of 2 cases fractures newborns that happend at time of birth that cased by mechanical force this fracture from metacarpal bone of right fore limb. Mostly there was work on the fetus before resorting to forced extraction that causing reducing of lubrication to the birth canal (Nuss et al., 2011). Gorgul et al. (2004) also reported that the frequency of the disorders of extremities 80.6% it was by incorrect manipulations at time to helping for birth in calves. Fractures frequently happened on the metacarpal bones (Arican et al., 2014).

Arican et al (2014) used intramedullary nails for 20 newborn calves with long bone fractures, and not have complication about fracture healing postoperatively. Almost all cases were in a good condition by clinically and radiological examination postoperatively.

Gangl et al. (2006) that used fiberglass full limb cast in almost metacarpal and metatarsal fracture. It was excellent for closed fractures and fair to the open fractures. Open fractures can sometimes be treated by full casting, but the prognosis for a successful outcome become smaller substantially about closed fracture and significantly fracture management is higher. In this study used full limb cast for the one calf that only one day had forelimb metacarpal fracture in distal epiphysis after taking radiograph for its leg treated it by applying full limb cast.

Latest study by Belge et al.(2016) in Turkey that used T-shaped LCP, was used in treatment metacarpal fracture in calf. There were applied three screw holes on top of the plate and 6–8 holes on the body area. The limbs were in good lining up, the calves were fully can weight bearing, walk and client. in this study used LCP plate for distal epiphysis of metacarpal fracture in only on calf 30 days in old, which happening fracture after birth. Prognosis for using this plate is good after 45 days.

In ruminants, mineral deficiency can decrease metabolic pathways needed for normal body function severe deficiencies are manifested by symptoms corresponding to the function of the deficient element in the body (Dittmer and Thompson, 2010). Deficient of vitamin D availability might cause skeletal deformations the clinical result of lack vitamin D are deformed, bowed, and shortened long bones (Ziesemer KA, 2013).

According to Dittmer and Thompson (2010) recorded that, cattle are more oversensitive to lack of phosphor than sheep. Decreased growth is among the earliest symptom of rickets. In animals, result of rickets also in curvature of legs, lameness, impaired mobility, and recumbence. In the sheep, clinical signs of rickets consist of stiff gait, bowed legs, lameness, enlarged joints (specially radiocarpal), and loss weight gain. Vitamin D has long been known as its important role in preventing rickets and osteomalacia in adult human and domestic animals, also have important roles for the maintenance of a healthy skeleton (Dittmer and Thompson, 2011).

As in animals, lack of vitamin D in growing children source of rickets or other bone disorders, display by weak bones and bone curvature that caused bowlegs, knock knees and narrow chest. Vitamin D deficiencies In adults can cause of softening and weakening of bones (osteomalacia) (Newcomer and Murphy, 2001).

6. CONCLUSION

Thirty-three 33 newborn ruminants include in this study were recorded for extremities deformities. The animals ranged in age from one day to 60 days, was 25 of them calves 7 lambs, and one kid, seven of newborn were female and 26 were male. The breeds of all calves cases were (23) Simmental and two local black. All the deformities information was congenital flexor tendon contraction, fracture, and deformity from the shape of limbs bowlegs (O shape) and knock knees (X shape).

The cases was presented with the history, clinical signs after that we take Radiography for those suggestion of newborn ruminant extremity (limb) deformity, the animals breed, age, weight, sex, birth, type of deformity, and duration between the affected and presentation to the veterinary hospital were recorded over all (33) of newborn ruminant their ages between (1- 60) days was 25 of them calves, 7 lambs and one kid, seven of newborn were female and 26 were male. The breeds of all calves was 23 simmental and two local black. All the deformities information was recorded for each case consist of (congenital flexor tendon contraction, fracture and deformity from the shape of limbs bowlegs (O shape) and knock knees (X shape).

Congenital flexor tendon contraction the most abnormality was recorded in (28) newborn ruminants which 21 calves (16 male, 5 female), 6 lambs (5 male and 1 female) and had (1) male kid that were deformity from forelimb and hind limb more abnormalities in the forelimb bilaterally.

When examining affected a neonatal with flexural limb deformities, it was important to determine can stand without assistance or not. If the newborn can stand, specific therapy for flexural limb deformities is often unnecessary. The newborns were affected mildly (9) cases were 7 of them calves 2 lambs, (7) cases unilateral and (2) cases bilateral. Mild flexural deformities usually respond to physical therapy with manual stretching of the tendons during exercise. The newborn should have controlled by exercise for 10 days. The goals of controlled exercise are to help lengthen or stretch the palmar or plantar soft tissues. Moderate cases (14) cases were 11 calves and 3 lambs which (5) cases unilateral, (8) bilateral and one (1) calf was all of the limbs was affected moderately from fetlock joint. All cases were treated by using a bandage, splint and vitamins (AD3E and multivitamins). That newborn can bear weight on the limb with fetlock joint knuckled forward (flexed). In these instances the limb should be splinted to extend the fetlock joint and load the flexor tendons cause can not stand newborn If the calves cannot stand, splinting the limb in extension is necessary to allow the calve's body weight to load and stretch the tendons and palmar soft tissues. A splint was applied for 7 day to force the animal to bear weight on its toes.

The purpose of splints is to align the limb so that the animal's body weight can stretch the tight tendons and ligaments; PVC is more frequently used than wooden splints. Good quality PVC piping is not only light but also has a concave inner surface that fits well to the contour of the limb.

In mildly and moderately contracted limbs, all flexural deformities were resolved after the treatment processes. In these cases the most common problem was contamination of bandages with faeces, urine, and dirt for this reason renewed the bandages. In five cases, mild local inflammation was observed around the skin. The final results were excellent in 11 calves, and good in two calves. All calves were raised until they reached ideal weight for slaughtering. Because of the potential genetic aetiology of the deformities, the owners were warned to not use these cattle as broodstock.

SUMMARY

SAEEDALAH KM, Studies About Extremity Disorders and Treatment Options In Neonatal Ruminants. Yüzüncü Yıl University, Institute of Health Sciences Department of Surgery MSc Thesis, Van, 2016. Extremity deformity in this study had investigated 33 of newborn ruminant, the consist os materyal, their ages between (1- 60) days was 25 of them calves which breeds of the calves were 23 Simmental and only 2 cases local black, 7 lambs and one kid. Seven of newborn were female (22. 33 %) and 26 were male (78.78 %). As a Table 3: Mild cases (9) treatment results are resolved, Moderate cases (14) treatment results are resolved, Severe cases (5) treatment results are: two (2) cases are resolved 2 cases by bandaging and splint, and 1 kid by tenotomy, but remain deformity in 3 cases that applied bandage and splint. Congenital contracted flexor tendon, observed most frequently as flexion of the metacarpophalangeal or metatarsophalangeal joint within 1 or 2 weeks of birth, is a common defect in numerous breeds of cattle. Severe flexural deformities are also accompanied by arthrogryposis, involvement of multiple limbs and the head and neck, and severe carpal deformities. Chronic deformity may lead to skin ulceration on the dorsum of the fetlock and, subsequently, to septic arthritis. In this study, in newborns lambs, with tendogen deformities kids and the other small animals, bandaging, splind and tenetomies interferences are exellend results and we are propose our colleagues.

Key words: Neonatal ruminants, extremity disorders, treatment options.

ÖZET

SAEEDALAH KM, Yeni Doğan Ruminantlarda Gözlenen Ekstremite Bozuklukları ve Sağaştım Seçenekleri Üzerine Çalışmalar. Yüzüncü Yıl Üniversitesi Sağlık Bilimleri Enstitüsü Cerrahi Anabilim Dalı Yüksek Lisans Tezi, Van, 2016. Bu çalışmada, yeni doğan 33 (otuzüç) ekstremite deformiteli ruminant incelenmiş; materyal yaşları bir-altmış gün arasında olan buzağıların; 23'ü Simental, 2'si Yerli Kara, 7 kuzu ve bir oğlaktan oluşmuştur. Olguların 7'si dişi (22.33%), geri kalanı erkek (%78.78) idi. Tablo-3'e göre, olguların 9'u hafif, 14'ü orta dereceli idi ve sağaltım sonuçları olumlu, geri kalan şiddetli dereceli 5 olgunun 2'sinden olumlu sonuç alınırken, 2 olgu bandaj ve siplint uygulamalarıyla, bir oğlak ta ise tenetomiden olumlu sonuç alınmış; diğer 3 olgu ise bandaj ve siplint uygulamasıyla iyileşmiştir. Kongenital tendo kontraksiyonlu buzağılarda, doğumdan sonraki 1-2 hafta içinde metacarpofalangeal ve metatarsofalengeal eklemlerde çeşitli lezyonlara rastlanılmaktadır. Şiddetli fleksor deformiteli olgularda aynı zamanda arthrogripozise gözlenmekte, bu olgularda baş, boyun ve karpal bölgelerde şiddetli deformitelere oluşmaktadır. Bu kronik deformiteler topuk eklemlerinde ülserlere ve septik arthritise neden olmaktadır. Bu çalışmada tendojen deformiteli doğan buzağılarda bandaj, splint ve tenetomi uygulamaları gerçekleştirilmiş ve elde edilen sonuçların duyurulması hedeflenmiştir.

Anahtar Kelimeler: Neonatal ruminantlar, ekstremite bozuklukları, tedavi seçenekleri

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CURRICULUM VITAE

Kwestan Mahmood SAEEDALAH, I am from Sulaimani city in the North Iraq, also I was born on January 31, 1988, in Sulaimani. I was finished Primary, Secondary and High Schools in Sulaimani, after that I begin the undergraduate admission process at the University of Sulaimani-College of Veterinary Medicine during the years (2004-2010), and I was awarded a Bachelor's degree in Veterinary Medicine and Surgery (BVMandS). While I got my Diploma I worked as an employee (Veterinary Physician) at the Ministry of agriculture and water resources, till now I work there. Finally, I came to the Republic of Turkey to begin the postgraduate admission process at the Yuzuncu Yil University-Institute of Health Science, Faculty of Veterinary Medicine-Surgery Department during the years (2015-2016).

ATTACHMENTS

1. Ethics Committee Project Permission Form

Evrak Tarih ve Sayısı: 02/03/2016-E.13886

T.C.
YÜZÜNCÜ YIL ÜNİVERSİTESİ REKTÖRLÜĞÜ
Hayvan Deneyleri Yerel Etik Kurulu

Sayı : 27552122-604.01.02
Konu : Prof. Dr. İsmail ALKAN'a ait projenin Araştırma Başvuru Onay Belgesi

Sayın Prof. Dr. İsmail ALKAN

Hayvan Deneyleri Yerel Etik Kurulunun 25.02.2016 tarih ve 02 sayılı kararı gereğince; Yürütücülüğünü yapmış olduğunuz "Yeni doğan Buzağılarda Arqure ve Bouleture'in İnsidansı, Sağaltım Girişimleri ve Sonuçları" adlı projeye raportör değerlendirme sonucuna göre YUHADYEK tarafından 15.07.2016 tarihine kadar izin verilmiştir. Çalışmaya başlamadan önce, çalışmalarınızı kurul üyelerinin denetimine açmanız zorunludur.

Projeye denetleyici olarak Veteriner Fakültesi'nden Doç. Dr. Nalan ÖZDAL ve Deney Hayvanları Ünitesi'nden Yrd. Doç. Dr. Yıldıray BAŞBUĞAN görevlendirilmiştir. İlgili denetleyiciler ile çalışmaya başlamadan önce temasa geçmeniz gerekmektedir.

Gereğini bilgilerinize rica ederim.

e-imzalıdır
Prof. Dr. Semiha DEDE
Etik Kurulu Başkanı

Ek:Prof. Dr. İsmail ALKAN (1 sayfa)

Adres:Yüzüncü Yıl Üniversitesi Hayvan Deneyleri Yerel Etik Kurulu Zeve Kampüsü 65080 Tuşba / Van
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Ayrıntılı bilgi için irtibat: Mehmet Şah OĞUZ
Unvanı: Bilgisayar İşletmeni
Dahili No: 22007

Bu belge 5070 sayılı Elektronik İmza Kanununun 5. Maddesi gereğince güvenli elektronik imza ile imzalanmıştır.

2. Ethics Committee Results Of Research Project Form

T.C.
YÜZÜNCÜ YIL ÜNİVERSİTESİ
HAYVAN DENEYLERİ YEREL ETİK KURULU

ARAŞTIRMA BAŞVURU ONAY BELGESİ

	Araştırmanın Adı	Yeni doğan Buzağılarda Arqure ve Bouleture'in İnsidansı, Sağaltım Girişimleri ve Sonuçları
	Araştırmanın Yürütücüsü	Prof. Dr. İsmail ALKAN
	Yardımcı Araştırıcılar	Vet. Hek. Kwestan SAEEDALAH
	Kurumu	Veteriner Fakültesi
	Araştırmanın Tahmini Süresi	4 Ay
	Kullanılacak Hayvan Türü ve Sayısı	Buzağı 25 Adet
	Destekleyecek Kuruluş (lar)	YYÜ. Bilimsel Araştırma Projeleri Başkanlığı
	Başvuru Tarihi	07.01.2016

KARAR BİLGİLERİ	**Karar No:2016/02** **Tarih:25.02.2016**
	Yüzüncü Yıl Üniversitesi Veteriner Fakültesi öğretim üyesi/elemanı Prof. Dr. İsmail ALKAN sorumluluğunda yürütülmesi planlanan ve yukarıda başvuru bilgileri verilen Yüksek Lisans projesi gerekçe, amaç ve yöntemler dikkate alınarak ilgi başvuru belgeleri incelendi. Çalışmanın etik açıdan uygun olduğuna, projenin aşağıdaki hususlar dikkate alınarak yürütülmesine ve proje yürütücüsüne iletilmesine oy birliği/_oy çokluğu ile karar verildi. 1) Projede herhangi bir değişiklik gerektiğinde kurulumuzdan onay alınması. 2) Projede çalışacağı bildirilen araştıncılarda değişiklik olduğunda kurulumuzdan onay alınması. 3) Deney hayvanları üzerinde yapılacak girişimin başlangıç ve bitiş tarihlerinin bildirilmesi. 4) Çalışma süresinde tamamlanamaz ise ek süre talebinde bulunulması. 5) Çalışma tamamlandığında sonuç raporunun gönderilmesi.

ETİK KURUL ÜYELERİ

BAŞKAN
Prof. Dr. Semiha DEDE

ÜYELER

Prof. Dr. Duran BOLAT	Prof. Dr. Sıddık KESKİN
Prof. Dr. Fazıl ŞEN	Doç. Dr. M. Fatih GARÇA
Doç. Dr. Atilla DURMUŞ	Doç. Dr. Abdulbaki AKSAKAL
Yrd. Doç. Dr. Ferda KARAKUŞ	Yrd. Doç. Dr. Fatih KAZANCI
Vet. Hek. Yrd. Doç. Dr. Yıldıray BAŞBUĞAN	Zir. Müh. Kenan YILDIRIMOĞLU
Vet. Hek. İsmail Hakkı BEHÇET	

***Bu form YÜHADYEK tarafından doldurulacaktır.**

Evrak Tarih ve Sayısı: 11/05/2016-E.29315

T.C.
YÜZÜNCÜ YIL ÜNİVERSİTESİ REKTÖRLÜĞÜ
Hayvan Deneyleri Yerel Etik Kurulu

Sayı : 27552122-604.01.04
Konu : Prof. Dr. İsmail ALKAN'a ait dilekçenin kararı

Sayın Prof. Dr. İsmail ALKAN

Hayvan Deneyleri Yerel Etik Kurulunun 05.05.2016 tarih ve 04 sayılı kararı gereğince; Yürütücülüğünü yapmış olduğunuz "Yeni doğan Buzağılarda Arqure ve Bouleture'in İnsidansı, Sağaltım Girişimleri ve Sonuçları" adlı proje ile ilgili 13.04.2016 tarihinde gönderilen dilekçede, proje başlığının Yeni doğan Ruminantlarda Gözlenen Ekstremite Bozuklukları ve Sağaltım Seçenekleri Üzerine Çalışmalar." Olarak değiştirilmesi talebinin kabulüne karar verilmiştir.

Gereğini bilgilerinize rica ederim.

e-imzalıdır
Prof. Dr. Semiha DEDE
Etik Kurulu Başkanı

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Unvanı: Bilgisayar İşletmeni
Dahili No: 22007

Bu belge 5070 sayılı Elektronik İmza Kanununun 5. Maddesi gereğince güvenli elektronik imza ile imzalanmıştır.

3. Plagiarism Result

YÜZÜNCÜ YIL ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ ENSTİTÜSÜ
LİSANSÜSTÜ TEZ ORİJİNALLİK RAPORU

Tarih: 14/10/2016

Tez Başlığı / Konusu: **Studies About Extremity Disorders And Treatment Options In Neonatal Ruminants**

Yukarıda başlığı/konusu belirlenen tez çalışmamın Kapak sayfası, Giriş, Ana bölümler ve Sonuç bölümlerinden oluşan toplam (44) sayfalık kısmına ilişkin, 13/10/2016 tarihinde şahsım/tez danışmanım tarafından turnitin.com intihal tespit programından aşağıda belirtilen filtreleme uygulanarak alınmış olan orijinallik raporuna göre, tezimin benzerlik oranı % 9 (dokuz.) dur.

Uygulanan filtreler aşağıda verilmiştir:

- Kabul ve onay sayfası hariç,
- Teşekkür hariç,
- İçindekiler hariç,
- Simge ve kısaltmalar hariç,
- Gereç ve yöntemler hariç,
- Kaynakça hariç,
- Alıntılar hariç,
-Tezden çıkan yayınlar hariç,
- 7 kelimeden daha az örtüşme içeren metin kısımları hariç (Limit match size to 7 words)

Yüzüncü Yıl Üniversitesi Lisansüstü Tez Orijinallik Raporu Alınması ve Kullanılmasına İlişkin Yönergeyi inceledim ve bu yönergede belirtilen azami benzerlik oranlarına göre tez çalışmamın herhangi bir intihal içermediğini; aksinin tespit edileceği muhtemel durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim.

Gereğini bilgilerinize arz ederim.

Kwestan Mahmood SAEEDALAH
14/10/2016
Tarih ve İmza

Adı Soyadı: Kwestan Mahmood SAEEDALAH

Öğrenci No: 14930001004

Anabilim Dalı:Veteriner Fakültesi Klinik Bilimleri Bölümü Cerrahi Anabilim Dalı

Programı: Cerrahi (Veteriner)

Statüsü: Y.Lisans ☒ Doktora☐

DANIŞMAN ONAYI
UYGUNDUR

Prof. Dr. İsmail ALKAN
(Unvan, Ad Soyad, İmza)

ENSTİTÜ ONAYI
UYGUNDUR

(Unvan, Ad Soyad, İmza)