



## Digital Amputation for the Salvage of Lamé Dairy Cows

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### Abstract

**Objective-** To study the effect of digit amputation on animal survival, and distribution of lesions on limbs, days in milk and parity in operated cows.

**Design-** Retrospective descriptive study.

**Animals-** Thirteen cows in a dairy herd consisting 1100 lactating Holstein cows.

**Procedures-** Digit amputation by using a loop wire after inducing local intravenous anesthesia.

**Results-** Digits of 13 cows were amputated during the period of study. Most amputations were done in hindlimbs. The average of parity during surgery was 3.3 that were higher from the average of parity in the herd (2.9). Eight cases were recorded in the third or less parities and 5 cases in fourth or more parity. The average of days in milk for all amputated cow is  $180.72 \pm 136.18$  days that in 5 cases it was recorded under 100 DIM and 8 cases is over 100 days.

Six out of 13 cows (46.15 %) were survived at least one year after surgery and 7 cows (53.85%) were culled after amputation. The main reason for culling in 2 (28.57%) cases was infertility but in other five (71.43%) was complications of the lameness. The average time to culling after surgery in culled animals recorded as 131 days.

**Conclusion and Clinical Relevance-** Regards to the results, digit amputation can extend lifespan of cows with some incurable digital diseases.

Digit amputation may consider as a salvage method in dairy farms. Some factors like the time of surgery, surgical technique and extent of the lesions may affect the outcomes.

**Key Words-** Digit, Amputation, Lameness, Cow.

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## Introduction

Lameness is the third cause of the economic losses in dairy industry after infertility and mastitis.<sup>1</sup> Losses are due to prolonged calving intervals, premature culling, reduced milk yield and quality and veterinary costs.<sup>2</sup> Common digit diseases such as sole ulcers, sole abscesses, foot rot, and white line disease may become complicated by extensive corium and laminar tissue necrosis leading to deep sepsis of the digit.<sup>3</sup> Infection may occur in anatomical structures, such as: distal and middle phalanges (P3, P2), the distal sesamoid bone, the flexor tendon sheath, the podotrochlear bursa, the deep digital flexor (DDF) tendon and the distal interphalangeal joint (DIJ).<sup>4</sup> Deep infection of the digit causes severe lameness and, in herds with a high incidence of lameness it can cause significant economic losses. Conservative treatment of deep claw sepsis, which may involve functional claw trimming, paring out to reduce the pressure on the defect, and administration of antibiotics and anti-inflammatory drugs, is not usually rewarding and only prolongs the animal's discomfort.<sup>1,4,6,11,14,15</sup> The only economically viable and promising treatment option, if euthanasia or slaughter is not undertaken, is broad surgical resection of the affected tissues.<sup>8,9,14,19</sup> This current study was done to evaluate the effect of digit amputation on animal survival and its distribution on limbs, days in milk and parity.

## Materials and Methods

**Dairy farm:** Data were collected from one dairy farm located near Shahrekord, Iran. The herd consisted of 1100 lactating Holstein cows housed in loose-stall barns (Open yards). Cows were milked 3 times daily and lactating cows were fed a total mixed ration (TMR).

Claw care programs such as hoof trimming, foot bath and management of bed were performed accurately. In this herd claw health was assessed by the professional claw trimmers. All digital diseases were treated by professional hoof trimmers and veterinarians and if a condition doesn't respond to current treatments and produce a deep sepsis in one claw, affected claw were amputated by the veterinarians of the farm.

**Surgical technique:** The whole leg below the hock or carpus was thoroughly cleansed using a surgical scrub. An elastic tourniquet was applied to the mid-metatarsal/metacarpal region or above the hock. In a 'foot crush' the loop used for lifting the leg makes an ideal tourniquet on the hindlimb. The tourniquet was applied for the duration of the operation. Local anaesthesia was induced with 30 ml of a 2% lidocaine without adrenalin (Nasr, Iran) injected into a convenient superficial vein. When anesthesia was completed a deep incision was made in the interdigital space close to the affected digit and along its whole length. The embryotomy wire was introduced into this incision and the claw was amputated by sawing through the interdigital space. Depend to the extension of the lesion only third or both third and second phalanx was removed. The incision site treated by second intention healing by topically dressing with antibiotic ointments and bandaged. The bandage changed until total epithelialization of the wound.

**Data analysis:** Age, parity, days in milk (DIM), survival of the animals and rate of culling were collected. All data were calculated and reported descriptively.

## Results

Digits of 13 cows were amputated during the period of study. Four (30.76 %) were in forelimb and 9 (69.24 %) were in hindlimbs that were separated between left and right limbs evenly. The average of parity during surgery was 3.3 that were higher from the average of parity in the herd (2.9). Eight cases were recorded in the third or less parities and 5 cases in fifth or more parity. The average of days in milk for all amputated cow was  $180.72 \pm 136.18$  days that in 5 cases it was recorded under 100 DIM and 8 cases is over 100 days.

Six out of thirty cows (46.15 %) were survived at least one year after surgery and (7 cows) (53.85%) were culled after amputation. The main reason for culling in 2 (28.57%) cases was infertility but in other five (71.43%) cows were complications of the lameness. The average time to culling after surgery in culled animals recorded as 131 days.

## Discussion

In dairy cows up to 90% of the lesions have been recorded in the hindlimb<sup>1</sup> that is much less in this current study. As a traditional belief digital lesions in the hindlimbs cure more rapidly but it needs more attention for complete healing and returning to the normal work in forelimbs. Maybe this is the main reason for higher frequency of the digital amputation in forelimbs in comparison to the incidence of the lesions in forelimbs.<sup>1</sup>

The average parity of the herd was recorded as 2.9 that is less than the average of the parities of the amputated cows. The long course of the disease in the digits and long time for its treatment maybe the main causes of the higher parities of the affected cows.

Survival time after amputations vary among studies as 23 of 41 (56%) cows were survived at least 1 year after amputation.<sup>12</sup> However Baxter et al.<sup>14</sup> reported that 30 out of 32 cows were eliminated from the herd within 1 year after the surgery.

In our study, 53.85% of the cows on which amputation was performed were culled by the first 131 DIM. In spite of the earlier studies that reported a postoperative lifespan of more than one year (13–22 months) after resection or amputation; lifespan was considerably shorter in the study of Starke et al.<sup>16</sup> Survival time of breeding bulls after digital amputation was 27.2 months,<sup>20</sup> which is longer than for cows. This may be attributed to the more intensive long-term post-operative care and lameness monitoring in breeding bulls than in dairy cows.<sup>1</sup> The prognosis for amputation was worse when the lateral hind digit was the one operated on, or when the animal weighed >682 kg.<sup>2,12,14</sup> Most of the affected digits in our study were in the hind limbs.

Nuss K. reported that lameness persists for 2–3 weeks post-operatively is indeed an indication of complications.<sup>17</sup>

Seventy one percent of the animals in this current study were culled because of lameness that was the same as some other studies<sup>7,10,18,12</sup> that reported lameness as the most frequent reason of culling after surgery; however Meyer- Buchtien believed that single most common reason for culling after digital amputation was reproductive failure.<sup>5</sup>

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## قطع انگشت به عنوان یک روش درمانی در لنگشهای ناشی از درگیری ناحیه انگشتان در گاوهای شیری

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**هدف** - ارزیابی قطع انگشت در گاو روی بقای دام و توزیع آن در اندام، روزهای شیردهی و شکم زایمان.

**طرح مطالعه** - مطالعه توصیفی گذشته نگر.

**حیوانات** - ۱۳ رأس گاو در یک گله نژاد هلشتاین با ۱۱۰۰ رأس گاو شیری.

**روش کار** - قطع انگشت با استفاده از سیم شاخ بری پس بی حسی کامل داخل وریدی.

**نتیجه گیری و کاربرد بالینی** - انگشت سیزده رأس گاو در طول این مطالعه قطع شد. بیشتر موارد قطع انگشت در اندام خلفی بود. میانگین شکم زایش در گاوهای مبتلا ۳/۳ ثبت شد که بیشتر از میانگین شکم گاوهای گله (۲/۹) بود. هشت مورد در شکم های زایش سوم و کمتر ثبت شد و ۵ رأس دیگر در شکم های بالاتر ثبت گردید. میانگین روزهای شیردهی در گاوهای جراحی شده  $136/18 \pm 180/72$  ثبت شد که در ۵ مورد زیر ۱۰۰ روز و مابقی بالای ۱۰۰ روز می باشد. شش رأس از گاوهای جراحی شده بیش از یک سال به زندگی اقتصادی خود ادامه دادند و ۷ رأس باقیمانده در مدت کمتر از یک سال از گله حذف گردید. علت اصلی حذف در ۲ رأس از گاوهای حذف شده (۲۸/۵۷٪) ناباروری و در دیگر موارد مشکلات مربوط به اندام حرکتی ثبت گردید. میانگین زمان حذف از جراحی ۱۳۱ روز ثبت گردید.

با توجه به نتایج، قطع انگشت می تواند عمر مفید اقتصادی گاو را افزایش دهد. قطع انگشت می تواند به عنوان روشی برای افزایش عمر اقتصادی گاو در گاوهای مبتلا به عوارض غیر قابل بهبود در نظر گرفته شود که در این راستا عواملی چون شدت عارضه، اندام درگیر و روش جراحی می تواند روی میزان موفقیت این روش درمانی اثرگذار باشد.

**کلید واژگان** - گاو، انگشت، قطع انگشت، لنگش.