FOOT CARE IN CATTLE

Compiled by

DEPARTMENT OF LARGE-ANIMAL SURGERY
FACULTY OF VETERINARY MEDICINE
STATE UNIVERSITY OF UTRECHT (THE NETHERLANDS)

and

ptc+

INNOVATION AND PRACTICAL TRAINING CENTRE
OENKERK (THE NETHERLANDS)
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INTRODUCTION

Dairy cattle in the Netherlands are regularly affected by soreness or even lameness of which the causes lie in the claws. Consequences are decreased milk yield, slower growthrate and a shortened life span.

No special attention would be required if the incidence was only occasional; a veterinarian would treat the disorder, maybe with more or less success, and that would be all.

However, in the last twenty years the number of cases of claw lameness has increased markedly. Every year one hears complaints about the large number of lame cows.

From occasional isolated cases, lameness has become a real problem. Not on all dairy farms, but nevertheless on so many that one can speak of a national problem in dairy farming.

This also holds for several other European countries where intensive dairy farming is practised.

There are two possibilities for solving this nation-wide problem in dairy farming. One possibility is generalized control measures, e.g. by a national animal health service.

The other possibility is control on individual farms, by the farmer himself. Examples of the first approach are the successful control of Tuberculosis and Brucellosis not so long ago. (By the way, Tuberculosis control started on individual farms, at the initiative of the farmer himself.)

One of the main reasons for a nation-wide, obligatory approach is the concern for public health.

As claw lameness in cattle does not pose a threat to human health (it is at most a cause for concern for the farmer), obligatory control will not become a reality so soon.

Therefore the individual farmer will have to come to grips with his problems himself and he can do so by means of proper foot care for his cows.
Proper foot care will have to consist of:

a) foot baths  
b) hygienic housing  
c) sensible feeding  
d) functional trimming

In order to better understand these measures against claw lameness, it is necessary to know something about the conformation of the foot and about the diseases of this foot, with emphasis on the hind claws and especially the outer hind claw.

Of late, however, problems with the front claws also come into the picture.

And is there any one aspect of dairy farming in which hereditary predisposition does not play a role?

When there are claw problems in dairy herds, they are related to hereditary predisposition, the housing of the cows and the care that is given to them. This means that breed and circumstances influence the story that can be told about claws; different breed, different circumstances - other features!

This guide about foot care in dairy cattle reflects the views of the Veterinary Faculty of the Utrecht State University on foot problems occurring in European intensive dairy farming, in which highly productive breeds of dairy cattle are involved.

Whether similar problems arise in other climates, with other housing conditions and other feeding habits, in these or different breeds, is not certain and must be investigated locally.

Solutions to problems will presumably not be the same everywhere; they must be adapted to local circumstances.

But in individual cases of claw lameness trimming will always be the most important procedure in treatment.

If there is a herd problem, trimming can play an important part in prevention as well as in treatment.

If there is no lameness problem, trimming can produce it.

The guide has been published in cooperation with the Agricultural Education Division, (Ministry of Agriculture & Fisheries) and is addressed to farmers and technical dairy farming personnel. It is meant to be used in practical courses on foot care in dairy cattle.

A specialized course for professional claw trimmers is regularly organized by the Practical Training Centre for Dairy Cattle and Grassland Management at Oenkerk, in close cooperation with the Department of Large-Animal Surgery of the Veterinary Faculty.

UTRECHT,  
Department of Large-Animal Surgery (Faculty of Veterinary Medicine)

OENKERK,  
Innovation and Practical Training Centre

Foot care in cattle is dealt with in detail in the book ‘Cattle FootCare and Claw Trimming’, published by Farming Press - Wharfedale Road, Ipswich IP1 4LG - United Kingdom, from which edition the underlying manuscript is an extract.
THE CONFORMATION OF THE FOOT
(figs. 1 to 5)

The foot of the cow has the following parts:
1. The horny wall of the claw.
2. The perioplic horn; backwards it widens into
3. the heel or bulb.
4. The weight-bearing border of the wall.
5. Growtherings.
6. The interdigital space.
7. The coronet.
8. The sole; when the claw is normal and healthy, its thickness is 5 to 7 mm.
9. The soler part of the heel; it is the weight-bearing part of the heel.
10. The white line; it is the horny connection between the weight-bearing border and the sole.
The white line consists of rather soft horny tissue of which the colour is not white (as the name suggests), but greyish.
11. The hairless interdigital skin.
12. The hairy skin of the foot.
13. The dew claws.
14. The pastern.

Remarks.

— In the back half of the claw, the wall should stand more or less perpendicular to the ground; it should not bend inward. The height of the wall in the back part of the claw is the height of the claw.
— The sole becomes slightly concave in the direction of the interdigital space.
— The claws should be able to bear the weight of the body in an almost upright position (they should not fall over). The pressure is then evenly spread over the quick.
— The claws should be about equally high. This will ensure a proportional weight-bearing by the inner and outer claw.
— The horny shoeh is part of the outer skin of the foot.

— The heel must be well developed.
15. The corium, also called the "quick"; it has blood vessels and nerves.
16. Digital cushion; it has a shock-absorbing function.
17. The deep flexor tendon.
18. The navicular bone.
19. The pedal bone.
20. The short pastern bone.
22. Shin bone.

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The horny shoe is formed at the surface of the quick; it does not have blood vessels and nerves. The horn "grows" forward down, in a direction about parallel with the anterior margin of the claw. The horny wall "grows" from the top downward and wears off at the bottom (along the weight-bearing border). The wall may be compared with the human nail.

If necessary, the weight-bearing border can be trimmed (clipping or cutting); the same applies to overgrowth of horn under the sole and the heel.

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The horny shoe protects the quick.

The horny sole and the heel provide an even support to the quick.

Touching (wounding) the quick is painful for the cow and causes bleeding. On top of this, infection may cause inflammation of the quick, especially when the claw is not in a healthy condition.
WEIGHT-BEARING BY THE OUTER CLAW OF THE HIND FOOT.

When the cow is still young, the hind claws are about the same size, but slightly different in shape.

The sole-surface of the outer claw is just slightly concave, while the inner claw is more concave (fig. 6).

This does not apply to the claws of the fore feet (fig. 7), which are both rather flat.
Consequently, in the case of the hind feet claws, on a flat surface (e.g. in a cow house) the outer claw tends to carry somewhat more weight, because of its better balance. Apart from this, the pressure on the outer claw is more irregular than that on the inner claw; it is especially the outer claw that receives the movements of the body of the cow. (This does not apply to the fore feet claws). In the long run a heavier and a more irregular load makes the outer claw to form somewhat more horn; to become somewhat bigger than the inner claw. The outer claw becomes higher than the inner claw and this increases the load considerably (figs. 8 and 9). The cow will try to escape the overload on the outer hind claw by adopting a base-wide or a cow-hocked posture. In spite of this adjustment the outer hind claw remains overloaded (fig. 10).

In a continuously overloaded claw the quick may become bruised, underneath the hind border of the pedal bone. This can be painful, and may cause bleeding - which may lead to sole ulcers in the long run. The tendency of hind claws to develop in an uneven way is not always equally strong. With healthy claws the tendency is limited and functional trimming (in order to reduce excessive height of the outer claw) will be unnecessary or hardly necessary.

But, in the presence of claw diseases (inter-digital dermatitis and laminitis) the tendency of excessive horn formation in the outer claw is uncontrolled and becomes very much apparent (fig. 11), together with hornshoe deformities and defects which go hand in hand with the above-mentioned diseases.

In that case functional trimming of the hind claws is necessary and remains necessary over and over again!
DISEASES OF THE FOOT.

These diseases are:
- interdigital dermatitis
- laminitis
- interdigital phlegmon
- digital dermatitis

Interdigital Dermatitis

This disorder occurs almost wherever intensive dairy farming is found and it is one of the main causes of claw lameness in cattle.

The disease starts with a wet, stinking inflammation of the skin in the interdigital space (fig. 12); hence the common name „stinky foot“. (footrot should be reserved for sheep!)

The inflammation of the interdigital skin may spread to the heel horn of the adjacent claws. Abnormal horn formation, with ridges or fissures (figs. 13 and 14) may lead to contusion of the quick in this region. This is accompanied by soreness or lameness.
The infection stimulates horn formation of the wall and the sole, particularly in the outer hind claw. Consequently this claw becomes excessively high and considerably overloaded.

Contusion of the quick will especially occur in this overloaded outer hind claw.

In the long run the quick can be damaged by contusion, even destroyed. Horn production stops and a hole develops in the horny sole. Such a defect is often called a sole ulcer.

A serious herd infection stimulates horn formation on all claws. It not only produces fissures in the heel area of the hind claws, but can also give similar problems in the front claws.

Interdigital dermatitis is the cause of a large number of claw deformities and abnormal leg positions (the cows adapt their stance, fig. 15, but the outer claw remains overloaded) and of a large number of lame and untimely wornout cows.

The control of the infection and subsequent symptoms consists of:
- foot baths
- hygienic housing
- timely and skilled trimming
Laminitis

Laminitis is a metabolic disorder of the quick that occurs mainly around the time when the cow is calving down. However, often it becomes apparent only at a later date when it manifests itself in changes in horn production and in changes in the form of the claw. Laminitis proper does not last long (a few days to weeks), but the changes in shape of the weakened claw may entail prolonged weight-bearing problems.

Continuous overloading promotes laminitis. Hence laminitis and its effects occur especially in the outer hind claws. One of these effects is increased horn production, resulting in yet more overloading as the claw becomes excessively high.

The result is contusion of the quick and sole ulcer; and again abnormal stances because of pain in the outer hind claws.

The most distinct changes caused by laminitis are:

- a buckled toe (fig. 16)
- abnormally distinct growthrings
- dropping down backwards (fig. 16)
- yellow or red discolurations
  (due to tissue fluid or blood) in the
  horn of the sole and the white line
- defects in the white line

Laminitis occurs mainly around the time when
the cow is calving down and is promoted by:
- prolonged overloading
  (enlarged outer claws on a hard
  surface)
- incorrect feeding

Control of laminitis and its effects consists of:
- timely and skilled trimming
- sensible feeding

N.B. Cows which have regularly had inter-
digital dermatitis or laminitis will have for
the rest of their lives deformed claws
showing unsuitable growth over and
over again.
Only by means of regular trimming
these animals can be maintained in the
herd till a reasonably advanced age.

**Interdigital Phlegmon**

Stinky foot-with-subsequent-horndeformation
should not be confused with interdigital
phlegmon (foul-in-the-foot).

Interdigital phlegmon is an inflammation
between the toes (fig. 17) i.e. above the inter-
digital skin, and is accompanied by a
hard swelling in the middle of the pastern region (fig. 18), just above the interdigital space. The animal shows acute lameness (fig. 19).

When treated at an early stage (by means of injections or powders), the inflammation generally disappears without causing permanent damage.

If it is not treated at all or if it is not treated in time, the inflammation may penetrate through the interdigital skin; this complication may be accompanied by prolonged lameness.

It is repeated that interdigital phlegmon occurs above the claws; in principle it does not affect horn formation.

There are indications that the frequent occurrence of interdigital phlegmon in a herd can be reduced by the use of formalin footbaths. This is of importance, in particular, for loose housing.

Animals in which the inflammation has penetrated through the interdigital skin should not use the formalin-bath.
Digital Dermatitis

Lately a fourth disease of the foot has been recognized, of which the extent over the world is unknown. It is described as "digital dermatitis", the symptoms of which are circumscribed, superficial inflammations of the skin bordering the claw. The hair around often stands upright. A single, intensive topical application of medicaments containing tetracyclines and "gentian violet" seems to be effective.

As the origin is unknown, preventive measures cannot be advised for the time being. Obvious lameness is a frequent symptom. Digital dermatitis can provoke excessive growth of horn.
PROBLEMS WITH FRONT CLAWS

Claw problems in dairy farming usually occur in outer hind claws.

However, if in cubicle housing it is difficult to control the stinky foot problem, the infection will also clearly manifest itself in the front claws, in the form of affected horn in the heel area and of overproduction of horn in the rest of the claw. Trimming of the front claws may then be considered.

Another problem with front claws, which has in later years revealed itself in loose housing, is excessive growth of the inner front claw. Often this is accompanied by changes in the shape of this claw (it becomes "cork-screw like") and by a base-wide toe-out position of the front legs.

When not very pronounced, there are few difficulties; but when it becomes very much apparent trimming becomes desirable.

The cause is thought to lie in the difficulty of reaching the feed at the feed gate. Pushing and overreaching is said to result in oblique overloading of the inner front claw. A solution may be found in elevating the feed passage with regard to the walking area.

However, problems with front claws do not arise in all loose housings and when they arise, their seriousness differs from case to case.
HEREDITARY PREDISPOSITION

Hereditary properties play a role in various aspects of claw problems; the resistance of the quick to influences of weight-bearing and pressure, the resistance of the animal to stinky foot infection and the resistance of the animal to metabolic disturbances or poisonings which manifest themselves in laminitis.

Properties which are all difficult to recognize because rearing, housing and care also influence the symptoms which can be observed on the animals.

This also holds for abnormal claw forms which cannot immediately be recognised as resulting from diseases (laminitis, stinky foot); what was already present and what has been acquired during life?

A sound advice would seem to be, not to continue breeding with animals which already have claw problems at an early age.
MEASURES TO CONTROL CLAW LAMENESS

a) Footbaths

Interdigital dermatitis is clearly recognisable on almost all dairy farms and can be reduced or at least be kept in check by means of footbaths. For the time being bathing will have to be repeated at regular intervals, as stinky foot infection is very difficult to eradicate.

![Image of cows in a barn](image)

Bathing can best be done in a solution of formalin: 3-5 litres of the commercial product in 100 litres of water.

If during summer the cows are milked in pasture, a stand-in bath, before stabling in the autumn, is quite suitable (fig. 20). The water should not be too cold.
When the cows are permanently milked in one place, a walk-through bath is a good solution (fig. 21).

How often and for how long bathing is necessary depends very much on the seriousness of the infection on the farm, which in its turn depends on the management.

The idea of bathing is the prevention of a really active inflammation of the interdigital skin by means of regular disinfection and strengthening of the interdigital skin and the heelhorn.

Then the hornshoe deformities (fissures) which cause so much lameness, will be largely prevented.

Under the present system of intensive dairy farming the regular use of disinfecting and hardening footbaths is a foot care measure of prime importance; it cures and it prevents.

Cows with open wounds, deep sole ulcers or with phlegmon having penetrated through the interdigital skin, should not stand in - or be led through - formalin baths.

b) Hygienic housing

The causal bacteria of interdigital dermatitis like moisture and warmth, but dislike air (oxygen). Hence they develop easier in dirty feet than in clean feet; easier under moist housing conditions than dry ones and easier in a warm cow house than in a cold one. In actual farming practice all sorts of variations and combinations occur.

Usually it is the farmer himself who determines hygienic conditions in the stable (reasonably clean and dry) rather than the type of housing.

Some general remarks with regard to the relation housing - stinky foot infection:
- stinky foot is a housing disease; grazing cures!
- in tie-up stalls, the infection is often limited to fewer animals than in cubicle stalls; in the latter all animals are likely to become infected
- in tie-up stalls the symptoms of individual animals are often more serious, with more horn deformities and lameness
- in tie-up stalls the front claws are largely unaffected
- in cubicle stalls the front claws also become affected, especially when grazing is increasingly restricted
- mixing of the bedding in cubicle stalls with lime (1 or 2 kg per box?) or with Ca-superphosphate (100-200 g per square meter) is said to promote "hygiene"
- hygiene is also: cleaning and disinfection!

c) Sensible feeding

The occurrence of laminitis is favoured by incorrect feeding. Especially sudden feed changes are dangerous! Particularly around calving, when the animal's body has to find new balances, feeding should be done with care:

- feed little or no concentrate during the dry period
- after calving, increase the amount of concentrate gradually
- make sure that there is always sufficient roughage for the cow; real roughage! Quite often with modern ensiling methods, the silage is not the right kind of roughage.

Also when the cow changes from stall feeding to grazing, sudden changes may occur which can be more easily received when some extra roughage is supplied (this will improve the composition of the rumen contents); fig. 22. Sensible feeding does not exclude laminitis, but decreases the chance of its occurrence. It is a preventive measure to some extent, probably lengthening the life span of the dairy cow. Moreover, sensible feeding is not expensive!
d) **Trimming**

Abnormal pressure may be exerted on the quick because of improper horn growth and of incorrect weight-bearing. In the long run this will seriously damage the quick. By means of trimming something can be done about this:

- an excess of horn underneath a claw which is too high may be cut away
- if there are no lesions, one should make sure that **sufficient healthy horn is left** to protect the quick
- this cutting should be done in such a way that the claws stand upright on the ground, which ensures an even pressure on the quick, by the pedal bone
- claws that are too long should be shortened first
- in case of lesions, horny borders which exert pressure must be cut away or be thinned down

So, improper (unsuitable) claws must be trimmed, preferably before lameness occurs. If there is a person on the farm who can judge the condition of claws, he knows which animals need foot care and how often they need it.

If this is not the case, then it makes sense to have all milking cows treated twice a year, as a matter of precaution.

When learning how to trim claws, the following working plan for the trimming of hind claws can be recommended.

0. **Judge** the length of the claws - usually the shape of the inner claw is more normal than that of the outer claw and hence the length of the inner claw must be taken as a yardstick 7.5 cm for an average Friesian cow.

1 A If necessary, clip the inner claw to correct length (fig. 23) and

1 B cut, departing from this length, a **plane bearing surface** underneath this claw (fig. 23). When doing this as little horn as possible (if any!) should be taken in the heel area, so that later on it will be easy to make the outer claw equally high.
„Plane“ includes: the bearing surface at right angles to the long axis of the shin bone in standing position. This ensures a stable supporting surface on hard ground (fig. 24).

A proper length ensures a proper thickness of the sole, certainly in the front part of the claw (5-7 mm). And a proper sole thickness (a sole hardly or not at all impressable) is important!

2A If necessary, clip the outer claw to the same length as the inner claw and

2B cut, if possible, the outer claw to the **same height** as the inner claw (fig. 24). „if possible“ because the sole may not become too thin!

The anterior margins should point in the same direction, when comparing the two claws (figs. 25, 26, 27). Again, make sure to obtain a „plane“ bearing surface.

fig. 25  outer claw higher bearing surfaces plane

fig. 26  outer claw higher bearing surfaces inclined

fig. 27  both claws plane and at the same height
3. If necessary, cut some "slope" in the sole (fig. 28).

Trim the other foot.

This is **functional** trimming.

If there are horn lesions remaining (fissures, a sole ulcer, separation of horn in the white line), then this "diseased" claw needs further treatment (**curative** trimming):

4. - take away more "height" towards the heel, in order to give the claw more rest (fig. 29);
   - possibly fix a block underneath the healthy claw in case the sole of the diseased claw becomes too thin (too vulnerable) (fig. 30);
5. - take away loose horn (fig. 30 a);
   - trim down hard ridges (fig. 30 b);
   - do not damage the quick!

Trim the other foot.

**N.B.** Good trimming is easier said than done; learning it requires good supervision.

If possible, trimming must be avoided during about three months before putting into use a new concrete stable; the excessive wear is not immediately compensated by a sufficient growth of horn.
Methods to restrain the cow

Trimming the claws without some method to restrain the animal requires a combination of strength, routine, patience and knowledge of cattle behaviour which may not always be on hand.

That is why methods to restrain the animal have been worked out, methods to hold the legs of cows fixed.

A practical method is hoisting up the leg (fig. 31). This does not require so much strength.

Most cows tolerate this action without undue resistance, the more so when it is done with patience and when the operator maintains „contact” with the animal.

With hoisting, the hind leg of the animal is tied with a rope, just above the hock; the leg is hoisted up vertically.

Boxes specially made for cows requiring care usually have an outfit for mechanical hoisting of a cows leg.
SUMMARY
For the practical foot trimming one should use the following 5 step schedule:

FUNCTIONAL TRIMMING:
1. Make the inner claw 7.5 cm long. Leave 5-7 mm thickness in the tip. Spare the heel.
2. Make the outer claw equally long, and make the bearing surface at the same level as the inner claw (if possible).
3. Make a slope (model) in the sole.

CURATIVE TRIMMING:
4. If the outer claw is damaged, make this claw lower towards the heel. So the weight is transferred partly to the sound claw.
5. Remove loose horn and trim down hard ridges.
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