

# Cow tracks

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## Objectives of a cow track

- Encourage rapid cow flow
- Allow cows to travel comfortably and easily considerable distances from the parlour
- Minimise damage to claws to minimise risk of lameness
- Keep cows clean
- Reduces loss of pasture due to poaching



# The ideal cow track

- Cushioned for cow comfort
- Wide (3-5m for main tracks close to parlour) so cows can spread and walk with their heads down
- Without sharp turns, very steep sections and bottlenecks
- Quick drying and free draining – 3-6% camber (maximum 10%), exposed to sun and wind drying
- Free of sharp grit and large stones
- Free of material that can trap between claws
- Good cow grip
- Not overly abrasive
- Fences wide of track so cows use the full width of track



## Plus

- Cheap materials that not require maintenance
- Just for cows (not tractors) to minimise track wear and reduce the presence of loose or rough stone

# Pasture - the ideal cow track?

- Dry, free draining pasture
  - Herd across fields if possible
  - Make provision to house prior to wet weather (N.B. make all changes to management gradually over 2-3 weeks)
- Often does not work all that well in practice with excessive poaching due to:
  - Unseasonally wet weather
  - Large and growing herd sizes
  - Gateways concentrating cow traffic



# Possible indicators of problems

- High or rising in lameness in spring, summer or autumn
- High levels of sole bruising, foul-in-the-foot, white line disease and stone damage after track use
- Bottlenecks in cow flow at herding
- Cows walking slower than 3 miles per hour
- Cows raising their heads at herding
- Cows touching or pushing against each other at herding
- Cows dunging on certain sections of tracks
- Cows walk along verges or choose single file routes



# Possible track materials

- Oolitic limestone
- Pine peelings (or wood chip)
- Chalk
- Sand
- Shallet or similar soft stone
- Concrete
- Concrete railway sleepers (topped with pine peelings)
- Crushed concrete, rubble or hard stone
- Cow carpet
- Fine stone e.g. basalt, quarry dust
- Tarmac, asphalt or bitumen
- Rape straw
- Stabilised soil
- Quarry belt (on concrete or tarmac)
- Recycled rubber chip

But avoid whenever possible:

- Road planings
- Rough screed or broken concrete
- Large river stone
- Builders rubble
- Mud



# Materials evaluated – cow friendly

✓=good, ✓ ✓ =very good, ✓ ✓ ✓ =excellent, ✗=not good, ✗ ✗=poor, ✗ ✗ ✗=very poor

Material	Comfort	Dry	Grit free
Oolitic	✓ ✓	✓ ✓	✓ ✓
Pine peelings	✓ ✓ ✓	✗ ✗	✓ ✓ ✓ (with terram)
Chalk	✓ ✓	✗	✓ ✓
Sand	✓ ✓	✗	✓ ✓
Shellet or similar	✓ ✓	✗	✓ ✓
Concrete	✓	✓	✗ ✗ ✗
Railway sleepers	✗ To ✓	✓	✗
Crushed hard stone	✓ ✓	✓ ✓	✗ ✗ ✗
Cow carpet	✓ ✓ ✓	✓ ✓	✓ ✓
Fine stone e.g. basalt, quarry dust	✓ ✓	✗	✗ ✗ ✗
Tarmac	✓	✓ ✓	✗ ✗ ✗

# Materials evaluated – farmer friendly

H=high, M=medium, L=low

Material	Cost to lay	Vehicle use	Maintenance
Oolitic	M	✓ ✓	L – patch every 2 years
Pine peelings	L-M	✗ ✗	H – top up twice year
Chalk	M	✗	L – patch every 2 years
Sand	M-H	✗	M – top up regularly
Shellet or similar	L	✗	M – top up every year
Concrete	H	✓	M – sweep monthly
Railway sleepers	M	✓	L-M - topping
Crushed hard stone	M	✓ ✓	L – patch every 2 years
Cow carpet	H	✓ ✓	L – replace after 5years
Fine stone e.g. basalt, quarry dust	M	✗	M – top up every year
Tarmac road	L	✓ ✓	M – sweep monthly

# Working out a budget

Material	Approximate cost per metre of 3m wide track
Oolitic (chalk similar)	£7 at £11/T (Bristol)
Pine peelings	Very variable
Shellet or similar	Labour and machinery hire
Concrete – tractors/cows (150mm) - cows only (100mm)	£50 (Kingshay) £37 (Kingshay)
Railway sleepers	£4.5 plus transport
Crushed hard stone – new stone track - track renovated	£14 (Kingshay) £6 (Kingshay)
Cow carpet	£2 plus track preparation (£10)
Fine stone/sand e.g. basalt dust (£14/T)	£10-14
Tarmac road/asphalt	£15-36 to lay

## Oolitic limestone (oolitic “sandstone”)

- Pros
  - Relatively inexpensive (£8 tonne before delivery- can be cheaper)
  - A crumbly, “sandy” form of yellow chalk
  - Probably the best “all-rounder” – comfort, life, maintenance and vehicle use
- Cons
  - Availability regionally determined
- Tips
  - Lay after a wet day – stone beds more easily
  - Lay 2-4 inches thick (50-100mm)
  - Buy 40mm “stone-to-dust”, with plenty of fine stone to fill in between the coarse
  - Top with the finer dust, rolled in
  - Use a vibrating roller to level the tracks and remove unevenness. Ideally use a dust to top.
  - Avoid heavy vehicle use





# Pine peelings (on a hard/ stone base)

- Pros
  - Best material for cow comfort
  - Usually cheap
  - Pine peelings better than woodchip
  - Excellent material for steep track sections provided topped up regularly (at top of hill)
- Cons
  - Sourcing can be difficult
  - Can lie wet, even with excellent drainage, drying winds and sunny weather. So it may not be the best for claw health
  - Requires regular topping (twice yearly)
  - Expensive to lay properly (requires a terram membrane to retain stones in the track base)
  - Potential for foreign body injury or bark trapping between claws
- Tips
  - Make tracks as wide as possible
  - Use fertiliser bags instead of terram membrane over base to keep costs down
  - Consider as alternative to soft stone as apron before concrete
  - It is important to guard against poor drainage and stones rising



# Woodchip (on compacted chalk)

- Pros
  - Offers excellent cow comfort similar to pine peelings
  - Chalk binds so a membrane isn't needed
  - Chalk can be used to make a camber
  - Wood chip drains better than pine peelings and takes longer to rot down. Overall, less boggy
- Cons
  - Wood chip could get stuck between claws
  - It needs regular topping up
- Tips
  - Like pine peelings it is important to have good drainage by raising the base 2foot above the surrounding ground and digging ditches if necessary
  - Works well on slopes. Apply the woodchip at the top of the hill and cows naturally drag it down the slope.



# Chalk (limestone)

- Pros
  - Relatively inexpensive
  - Readily available in a variety of grades (coarse for bases, 40mm to dust for capping, then dust for topping off)
- Cons
  - Can go slippery and pasty in wet weather
  - Can contain flints and sharp/hard stone fragments that need manual removal at laying
  - Can cause bruising and white line damage if not worked with machinery into a cow track. Uncrushed chalk can be worked into a less abrasive surface with a heavy (over 10 tonne) tracked digger
- Tips
  - Top with oolitic, sandstone fines, woodchip/pine peelings or sand to improve drying and reduce slipperiness



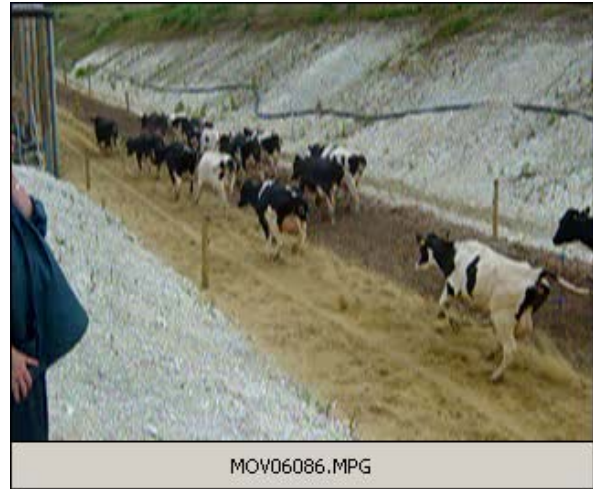
# Sand

- Pros
  - Good cow comfort
  - Readily available
- Cons
  - Can wash away on steep slopes, so may need topping up
  - Can be slow to dry
  - Deep sand can go boggy if drainage is not excellent
  - Requires regular topping up – so it can be expensive
  - An uncommon choice of track
- Tips
  - Lay as a thin layer over a chalk or soft stone so that it binds
  - Trialled using deep, coarse sand at Compton over rubber chip



# Deep sand on rubber chip

- This track at Compton proved extremely comfortable. Dunging was minimal



## Soft shales (shillet, rab, soft slate)

- Pros
  - Very cheap when quarried on farm
  - The softer and more crumbly the stone the better the comfort after compaction
- Cons
  - Can go slippery and can turn to mud in wet weather
  - Does not withstand heavy vehicle use (useful for cow tracks only)
  - Needs frequent topping up
- Tips
  - Make tracks very cambered and keep a supply for repairs
  - Use a vibrating roller to compact into a longer lasting surface
  - For hard forms of shale, hiring a stone crusher could be used to provide dust for topping off.





# Sandstone

- Pros
  - Relatively cheap (£8 per tonne for fines)
- Cons
  - Only certain forms bind well (e.g. Fittleworth quarry in Sussex). Other forms behave more like sand
- Tips
  - Use fines to top
  - Camber well
  - Use a vibrating roller to compact into a longer lasting surface



# Concrete (and tarmac)

- Pros
  - Can be used for vehicles (150mm thick) and cows (100mm)
  - No wear or water pooling – good for areas of heavy use
  - It can be scraped
- Cons
  - Can result in thin soles
  - Loose stones impact in claws
- Tips
  - Purchase a tractor driven sweeper. On tarmac cows will walk more quickly after sweeping.
  - Quarry belt, rape straw or carpet could improve cow comfort



# Railway sleepers

- Pros
  - Cheap in north midlands
  - Easily laid and theoretically portable
- Cons
  - See concrete
  - Abrasive unless topped with a softer material
  - Can move producing edges and gaps which could damage claws
- Tips
  - Lay on firm base material
  - Fix the ends with other sleepers laid length-wise



## Railway sleeper cow track next to vehicle track topped with pine peelings



# Crushed concrete (or hard stone)

- Pros
  - Relatively inexpensive
  - Readily available in most regions
  - Durable – a cheaper form of concrete
- Cons
  - Mostly laid without a camber (not always)
  - Hard loose stone can work loose
  - Some metal work usually present which needs careful removal
- Tips
  - Top with a softer material



# Cow carpet

- Pros
  - Tough enough for tractors and scraping
  - Theoretically mobile
  - Does not tear easily
- Cons
  - 300m lengths
  - Requires a prepared track before laying, with a layer of sand, quarry dust or road planings underneath. This adds significantly to cost.
  - Perhaps labour intensive to lay. Extra lengths must be stitched together with fishing nylon
  - Not good for tracks with bends
  - May get slippery
- Tips
  - Make a flat level track first, with no protruding stones, then put down sand





# Softtrak

- Softtrak is similar to cow carpet
  - Lay on top of quarry dust
  - Allow for some stretch



## Hard stone quarry dust (e.g. Basalt quarry dust)

- Pros
  - Readily available in most regions
  - Comfortable if laid deep
- Cons
  - More expensive than some other forms of stone
  - Some grit can impact in claws
  - Can wash away in wet weather
- Tips
  - Use an apron between the stone track and the concrete yards





# Rape straw

- Pros
  - Relatively inexpensive
  - Readily available in most regions
  - Excellent cow comfort
- Cons
  - Can lie wet, especially if drainage isn't excellent
  - Needs replacing at least annually
  - Difficult to maintain unless you can scrape tracks and minimise the effect of stones rising through the straw
- Tips
  - Use to top a well cambered stone track or concrete track

# Stabilised soil (or stone)

- Pros
  - Relatively cheap and simple
  - No materials apart from soil and cement needed
- Cons
  - Difficult to build up camber with addition of large amounts of soil (or stone)
- Tips
  - Cement can increase the life of a crushed stone track and reduce the amount of loose stone



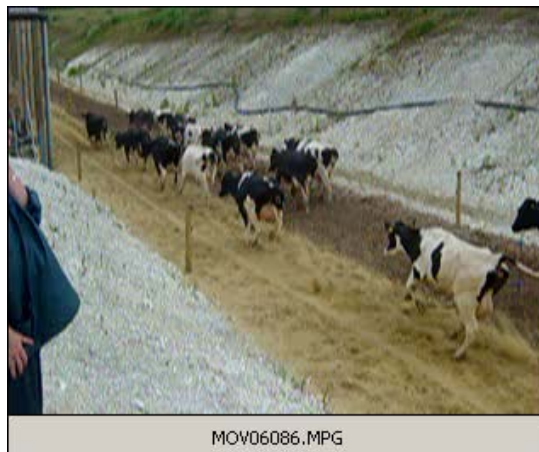
# Quarry belt (on a flat/solid base)

- Pros
  - Good cow comfort
- Cons
  - No good for tracks with bends
  - Slippery so no good for slopes or areas of cow turning/acceleration
  - Single track – may slow herding
  - Tractors will cause the belting to ripple
- Tips
  - Use down the centre of concrete vehicle tracks or to one side of a wide track



# Recycled rubber chip

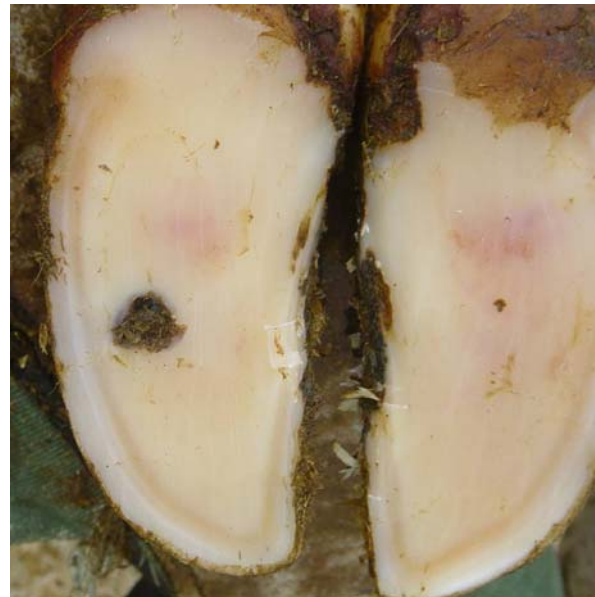
- Pros
  - Excellent cow comfort (and therefore can be made two cow width – 8-10ft)
  - Ideal for robotic systems where lameness and track comfort may dictate track usage
  - Can be used as a base, with a top dressing of sand or pine peelings (opposite)
  - Can be used as a 3 inch top dressing, replaced every 8 years as it doesn't decompose
- Cons
  - Hard to dispose of
  - Expensive at £70 per tonne, plus delivery – roughly £175-200 in Somerset (cheaper if 28 tonne artic load)
- Tips
  - Use rubber as a base, terram membrane and top with peelings or coarse building sand (see tracks at Compton opposite)
  - Terram membrane available from builder's merchant
  - If used as a top dressing, can harrow and roll with standard machinery
  - See end for supplier



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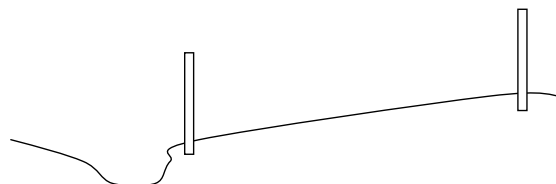
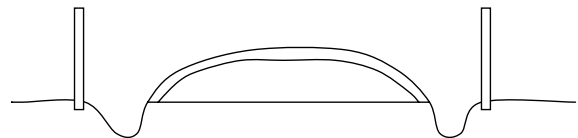
# The worst cow track material – road planings and road grit

- Grit dragged onto concrete with muddy feet will do severe damage
- Perfect size and shape for puncturing the sole and white line
- “Like scattering nails on a motorway”



## Construction – new tracks

- Farm quarry stone or rubble for base - cheap
- Build straight on top soil – crown raised 2 foot above surrounding ground
- Use a 3-6% camber (maximum 10%) – free draining, more wind/sun drying than one-way slope
- Make edges steep into ditches – prevents verge formation
- Place fences so it doesn't interfere with cleaning away ditches or verges, and does not affect cows walking along the edges of the track (especially electric fences on narrow tracks)
- Use a vibrating roller to increase durability and lifespan (vehicle tyres don't work, and cows feet should never be used)
- Apply in 150mm layers
- Remember – tracks sink so build them up well at the start



# Camber better than slope



Crown almost flat for comfortable cow walking



Less cow comfort, water shed across entire width

## Improving old tracks

- Improve drainage – open ditches, build up tracks and camber
- Improve drying – increase exposure to wind and sun by cutting hedges
- Renovate surface





# Renovating surfaces – the options

- Topping/capping with fine stone or soft organic material
- Mechanical stone crushing (contractors)
- Rolling with vibrating roller to remove rough edges on a rain washed track with a camber



## Problem areas – tracks to concrete or tarmac

- Reduce stones being dragged onto concrete yards with:
  - Aprons of soft stone or pine peelings
  - Minimising mud
  - Placing rubber mats/quarry belt at edge of yard might help, especially if cows go through a foot bath on way to collecting yard
  - Junctions between soft stone tracks and concrete need regular repairs
  - Quarry belt or carpet across stretches



# Problem areas - gateways

- Reduce poaching
  - Widen gateways
  - Move/rotate gates/field entrances
  - Extend tracks right through gateways
  - Concrete persistently problematic areas (cambered stone more difficult to achieve in gateways)



## Reducing the negative impact of tracks

- Reduce distances walked on tracks – night, paddocks, nursing paddocks, only use fields when conditions are suitable, re-route tracks to avoid problem areas (steep sections or wet hollows)
- Avoid using tracks for vehicles
- Sweep concrete or tarmac tracks regularly
- Allow cows to walk at own pace
  - Avoid dogs at herding
  - Disable the horn on the quad bike
  - Herd on foot
- Keep feet hard (formalin or breeding could help)
- Improve claw horn quality
  - Supplement diets with 20mg biotin per head per day
  - Increase dry matter content of diet
  - Increase forage: concentrate ratio
  - Increase amounts of non-ensiled forage in diets
  - Reduce slug-feeding of concentrate
- Treat feet before cows are lame
  - Limping cows are more likely to pick up stones or damage sound claws
  - Diseased horn is more likely to “attract” stones. Trim before drying off as a minimum



# Summary

- No track is perfect, but how the track and cows are managed will make a difference
- A track is as good as its performance on its worst day in the worst section– critically assess after the wettest week in autumn. Could you walk along it in socks?
- The cows, not the tractor, will tell you if a track is under performing – monitor lameness and cow flow



## Acknowledgments

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- Michael Jones, farm manager at Wyndhurst
- Defra
- Institute for Animal Health (Compton) and Elizabeth Berry
- Tubney Charitable Trust
- Steve Borsberry MRCVS
- Kevin Kearney BVSc, MACVS (Nz Veterinary Practice)
- MDC, ADAS, The Dairy Group and The Kingshay Trust
- Liverpool University

# Useful contacts

- Oolitic
  - Bristol
    - Steve Mead 01934 863000
    - Stone Supplies (contact George Gilchrist) 0117 9799840
  - Wincanton
    - W. Rolls Ltd, Evercreach 07970 082609
- Rubber chips
  - John Collis, Jackson Arenas (Castle Cary) 07795 965207/08700 615977
- Cow carpet
  - Mr. Allan Eardley on 01630 653002
  - Batchelor Enterprises (softrack £5 per square m, Texway £10 per square m)

## Bibliography – the research

An area of under-research. Four key research papers have been published:

1. Cows show preference for woodchip over stone tracks 96.4% of time (Gregory and Taylor 2002)
2. Hurried herding and hard, angular stone contribute to lameness (Clackson and Ward 1991)
3. Several risk factors identified for lameness in New Zealand herds (Chesterton and others 1989)
4. How to construct good cow tracks and how to safely herd cows in order to reduce lameness (Chesterton 1989)