



Racing
Operations
Department

Turf Track Management in the Sub Tropical Environment

亞熱帶環境的跑道管理

Sha Tin Racecourse – 沙田馬場



Happy Valley Racecourse 快活谷馬場



- Video

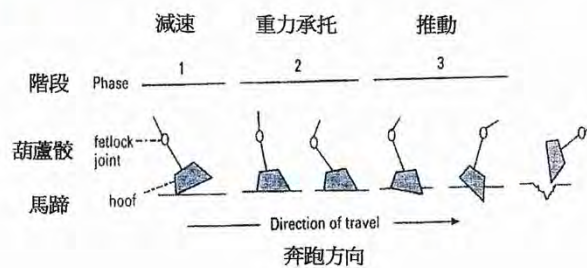


Source: JRA

The mechanics of Horse Gallop (馬匹快跑的結構分析)



馬匹快跑的結構分析 The mechanics of horse gallop

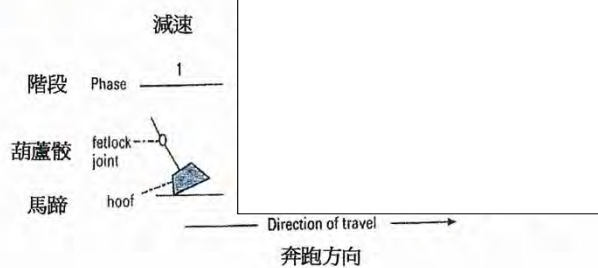


Field (1994)

“Deceleration (減速) phrase : Traction (場地接觸)”



馬匹快跑的結構分析 The mechanics of horse gallop



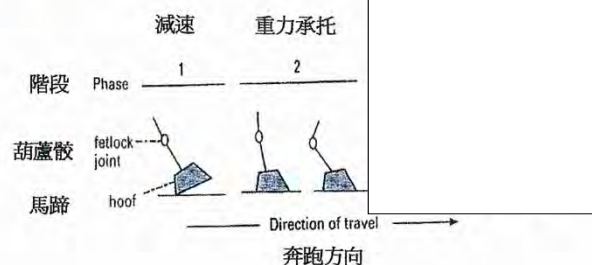
Field (1994)

Deceleration Phrase

- Stability & Traction (穩定性及接觸)
- Give vs Firmness (彈性對比堅硬)
- Slippery condition (跣蹄)
- Horse Welfare: stress & reaction on joints (馬匹健康: 關節所承受的壓力)

"Load bearing (動力承托) phrase : Compaction(壓縮)"

馬匹快跑的結構分析 The mechanics of horse gallop



Field (1994)

Look at the particle level

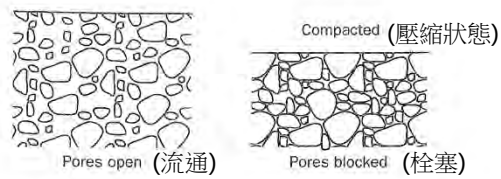
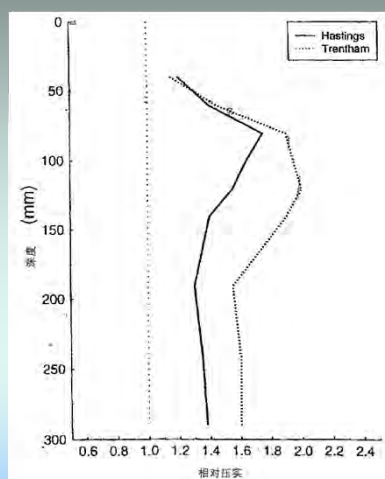


Figure 1. Soil density is increased and pore space reduced when a soil is compacted

McIntyre (1998)

Where it happens (壓縮層之形成)



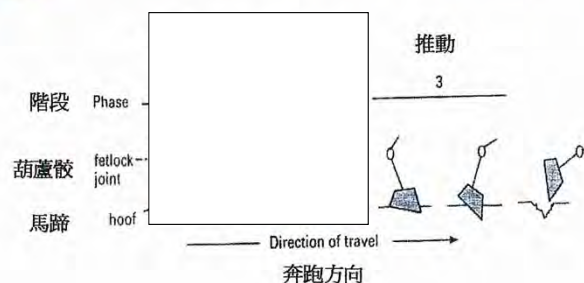
Field(1994)

Implication (影響)

- Poor air content: affects roots growth (缺氧)
- Drainage rate reduced: reduction of air pores, disruption of pore continuity (不去水)
- Hard pan formation: increase horse injury potential (場地硬化: 增加馬匹足部受傷機會)

Propulsion phrase (踢起蹄印)

馬匹快跑的結構分析 The mechanics of horse gallop



Field (1994)

Recovery from surface damage



- Divots: After horse gallop



- Divots Repaired (補沙) • Sprigging (補草)







Turf Nursery (Tifton 419)



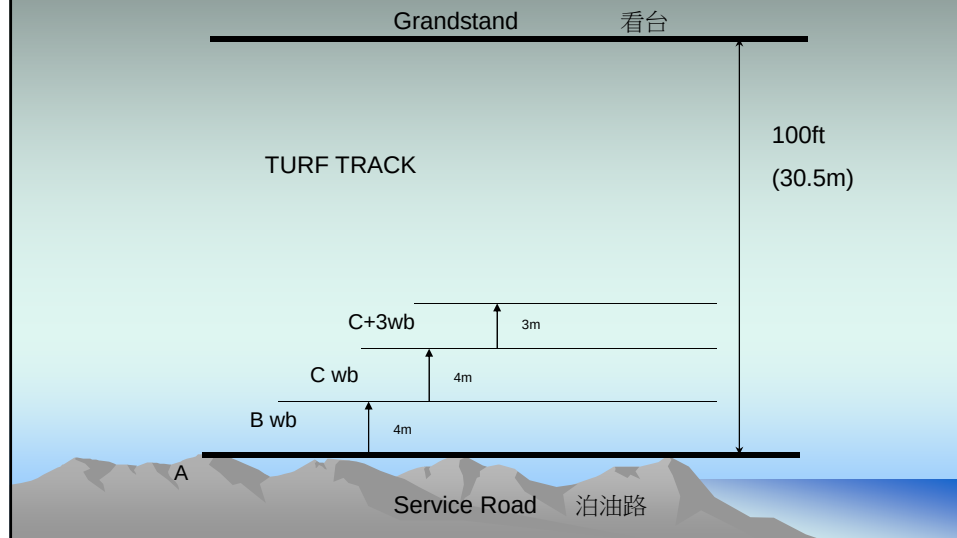
Turf Nursery (Ryegrass)



Rail movement – HV



(快活谷移欄規格)



Turf Block 巨型草磚培植



收割



替換過程



三星期後的狀況 (2008)

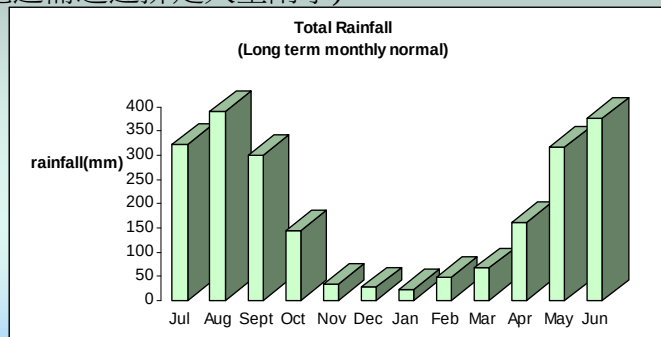


Rainfall (雨量)

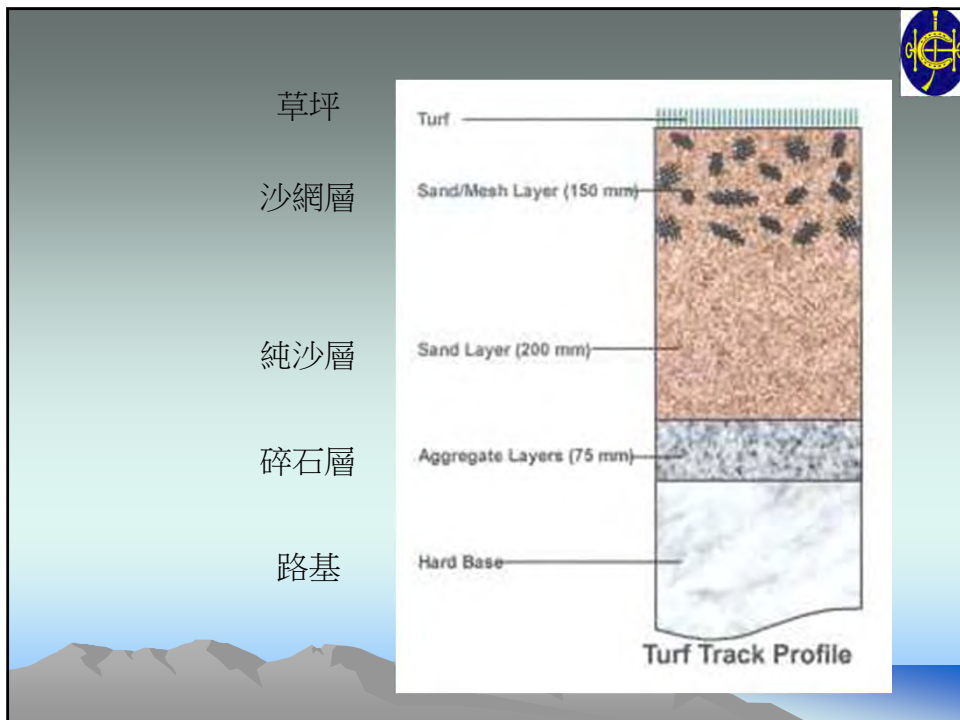
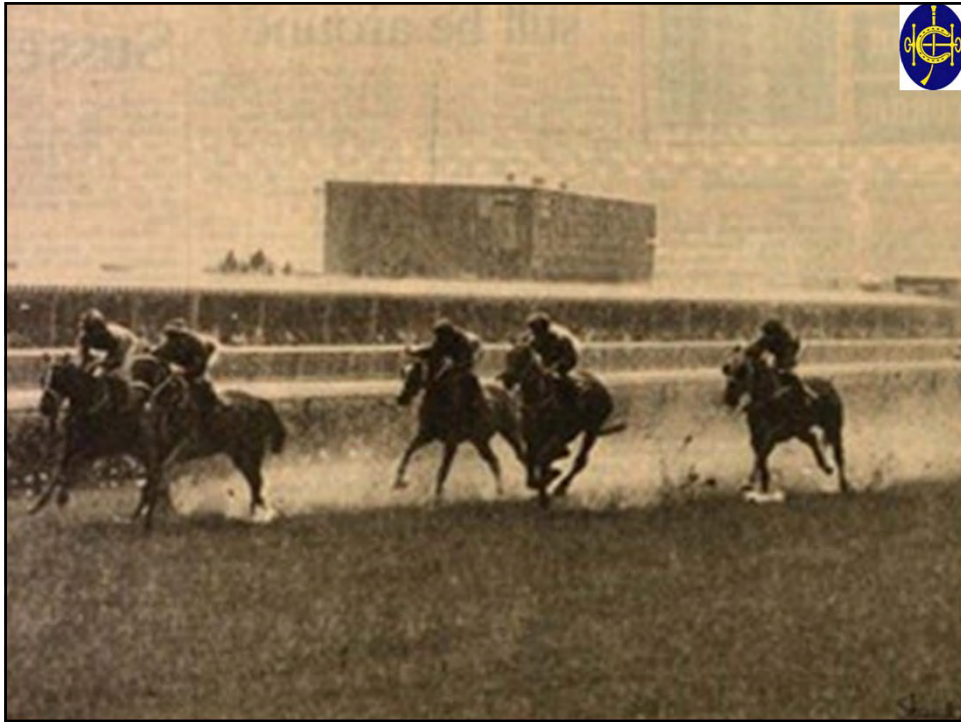


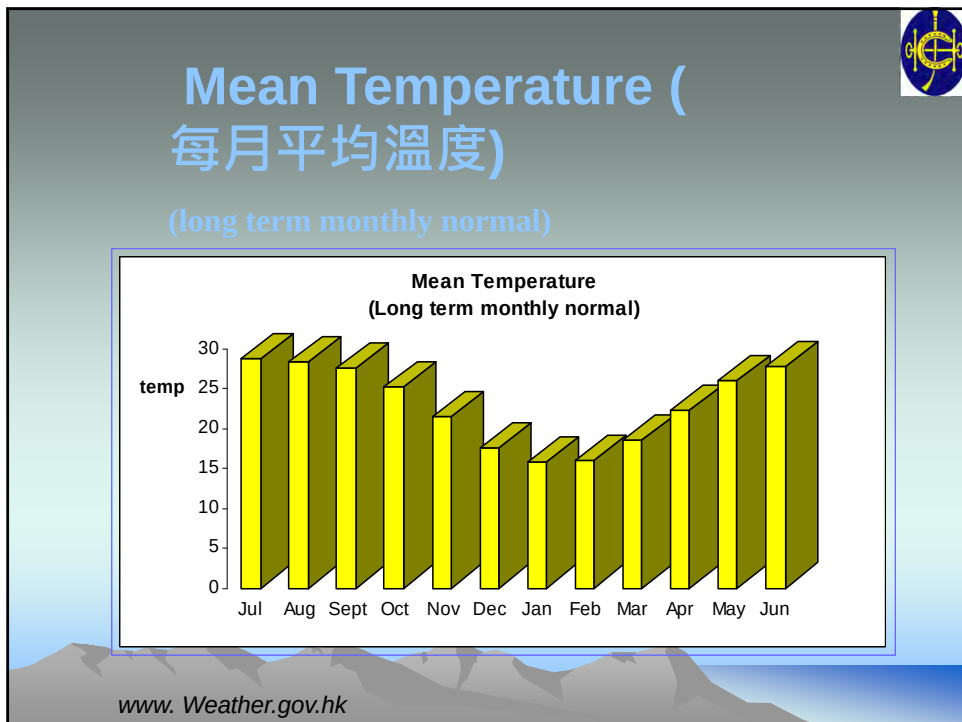
Rainfall: Track profile has to cope with Rainfall pattern

(跑道需迅速排走大量雨水)



[www. Weather.gov.hk](http://www.Weather.gov.hk)





Seeder (播草米機)



After Over seeding

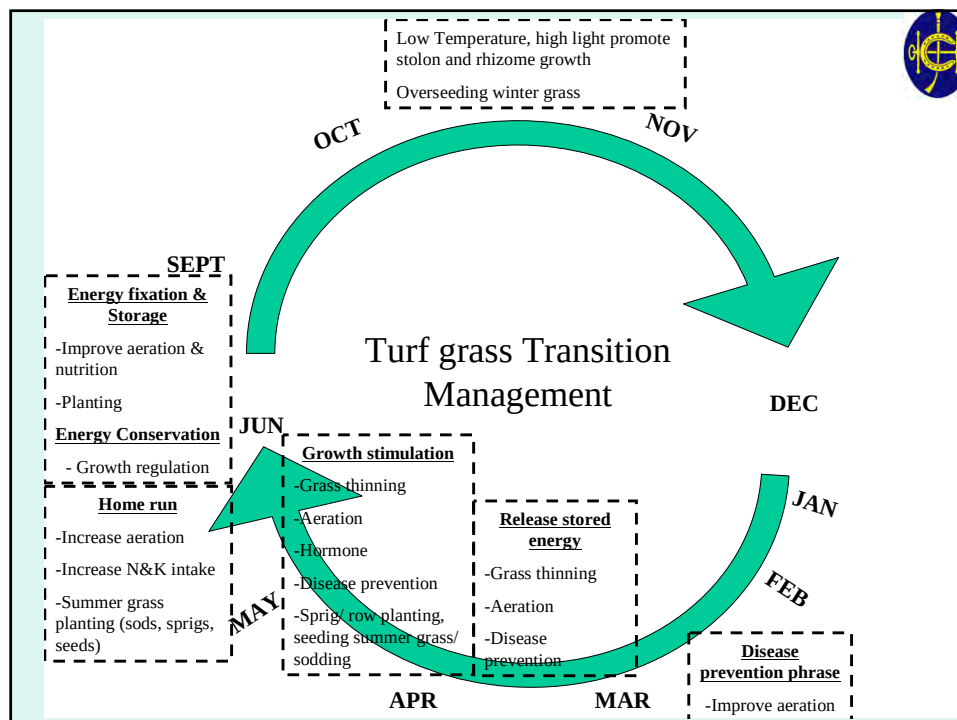


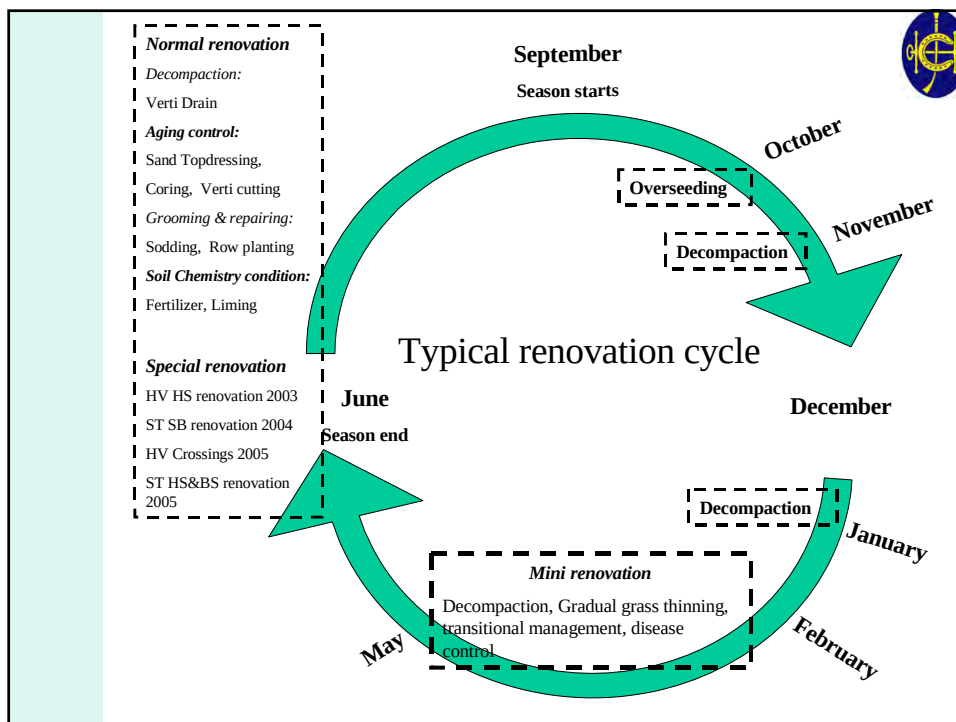
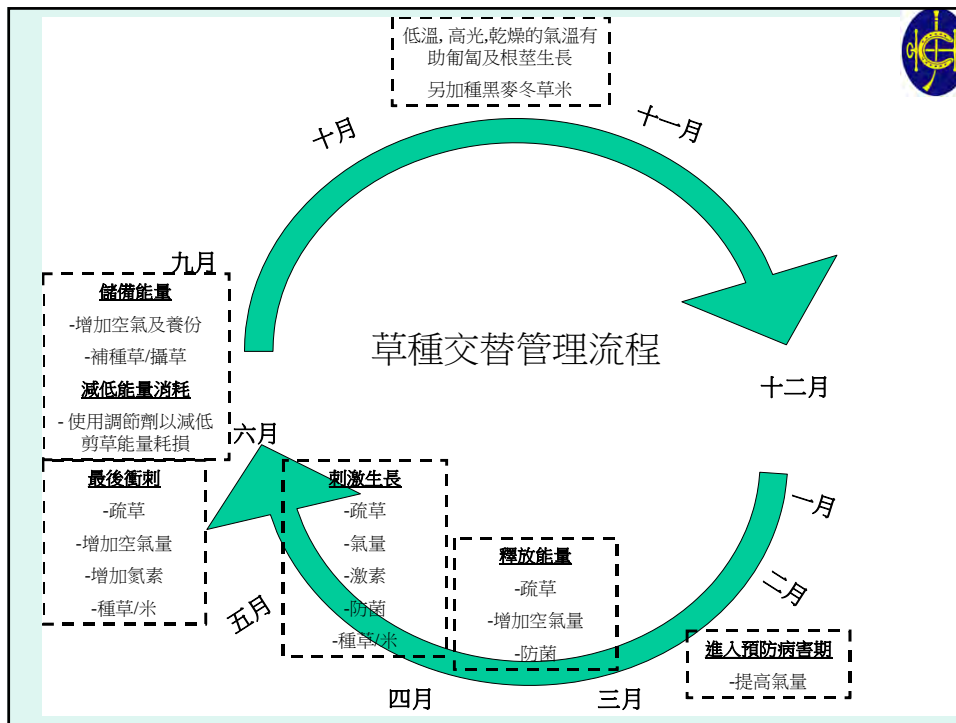
Two weeks later

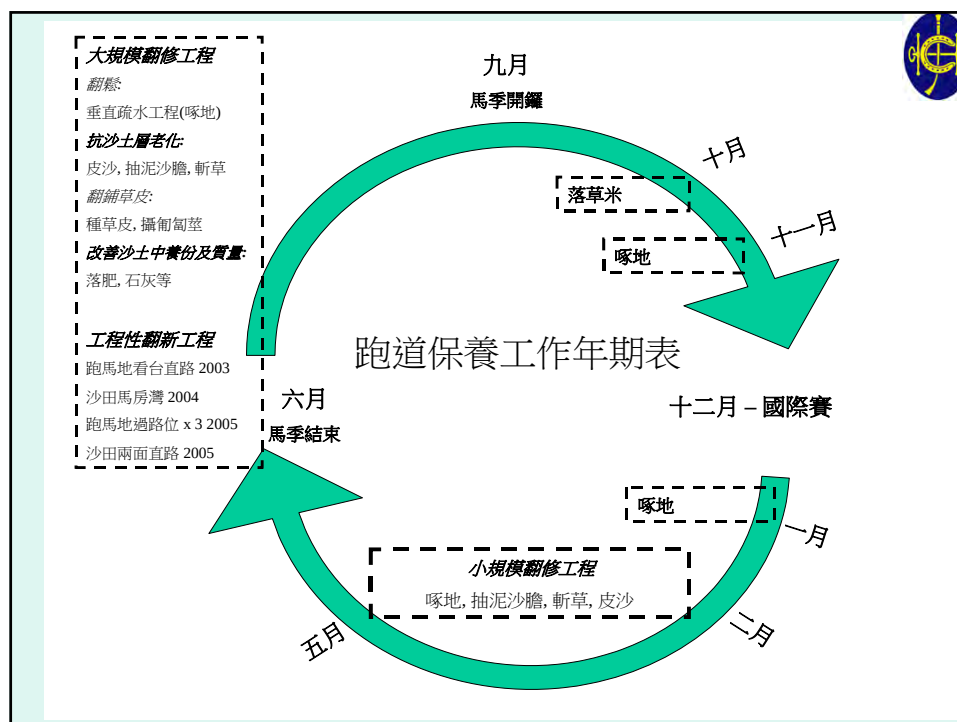


May 2001 Happy Valley

2001年5月
跑馬地







Coring (抽沙胆)



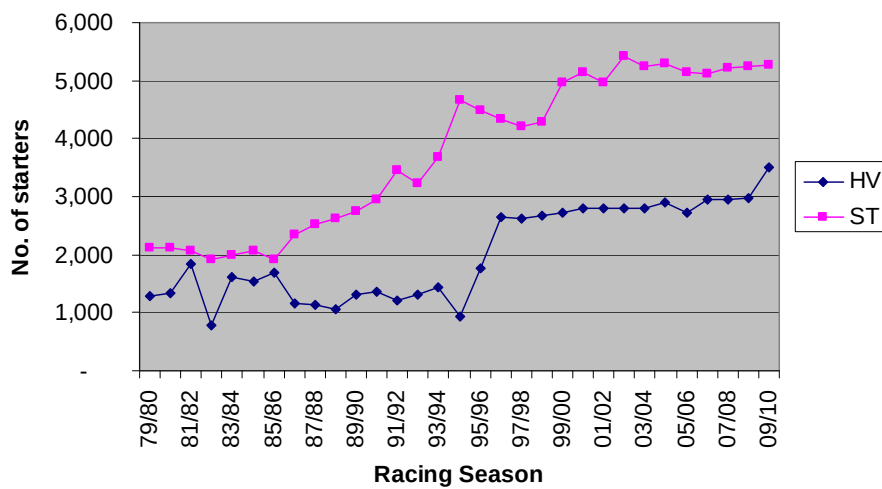
Sand topdressing (皮沙)

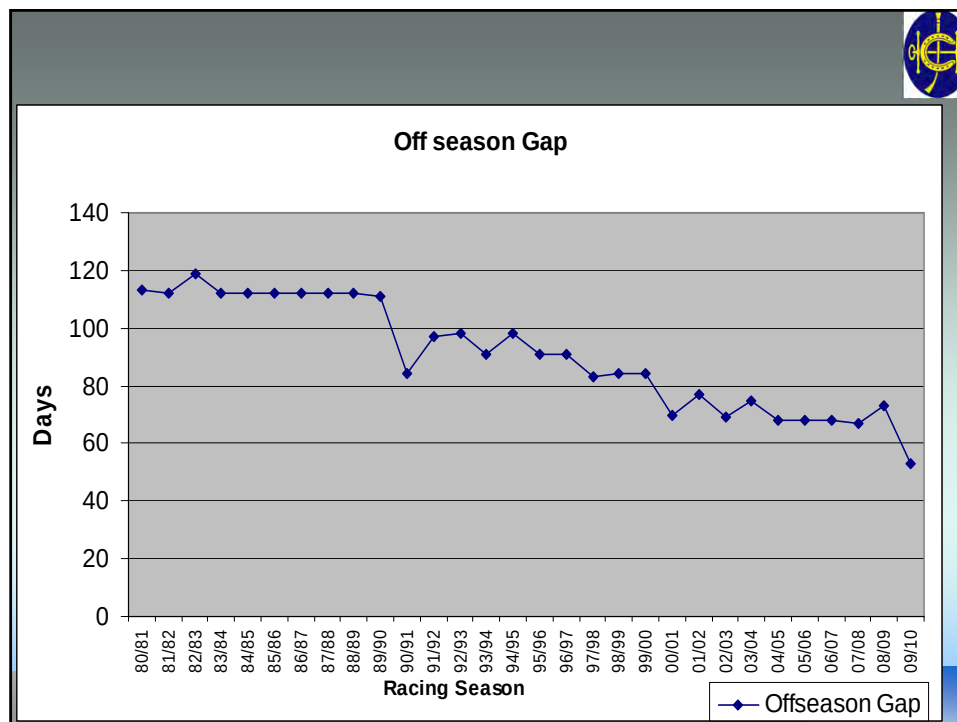


Verti-drain (啄地)



No. of starters per racing season





Adaptive Maintenance Strategies (大手術對比微創)

- Thick tines vs. thin tines 粗與幼針
- Lifting vs. vertical tines action 提升與垂直
- Close vs. wide coring spacing 密集與疏密度
- Heavy vs. light scarifying 密與疏刀
- Frequent topdressing (Dusting) 大量,小次 與 小量,頻施



Adaptive Maintenance Strategies (大手術對比微創)



疏針



密針

Common pests & diseases Pythium attack 1997



For instance, in 1997, massive winter grass cover was lost in April in Happy Valley track due to Pythium disease attack and weather condition. The loss was much more extensive than this May.

(1997年春天快活谷受棉腐感染--草坪大量枯萎)



Mole Cricket 土狗



Press interest in weeds



Weeds 1 (Goose Grass 牛根草)



Close shot of an *Eleusine indica*



Weeds problem caused by *Eleusine indica*

競爭及色差

Weeds 2 (Cyperus and Sedges)



Close shot of another *cyperus*



Patches caused by *cyperus*

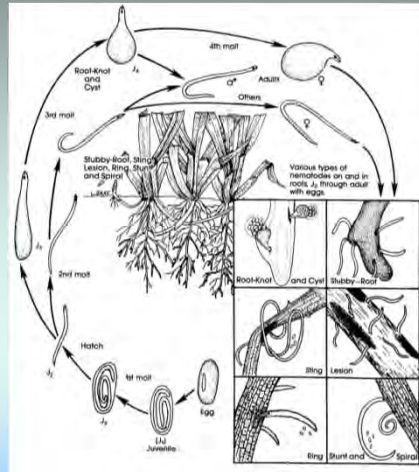
競爭及色差



From Dr. Tim Bowyer, 2010

Root Knot Nematode Life Cycle

根瘤線蟲生命週期



QC Programs 質量檢定方案

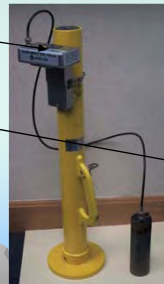
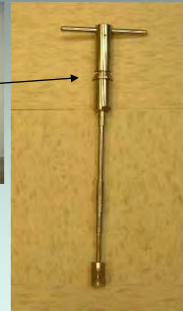
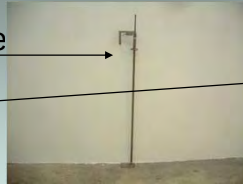


- Surface hardness
- Drainage rate
- Turfgrass composition
- Soil physics & chemistry
- Nematode population

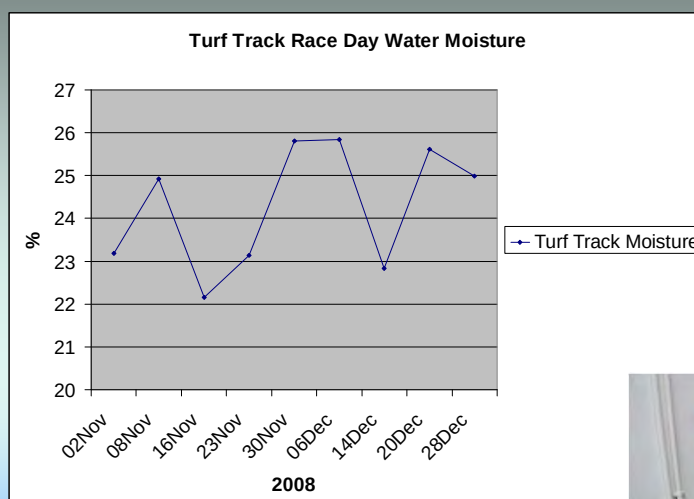


QC1--Physical Tests 物理性質

- **Penetrometer** : resistance to pt penetration
- **Shear Vane** : resistance toward surface deformation
- **Clegg hammer** : surface hardness
- **Going Stick** : resistance to pt penetration and surface deformation



QC 2--Water Content (水份)



QC 3– Nematode Assay

週年線蟲檢驗



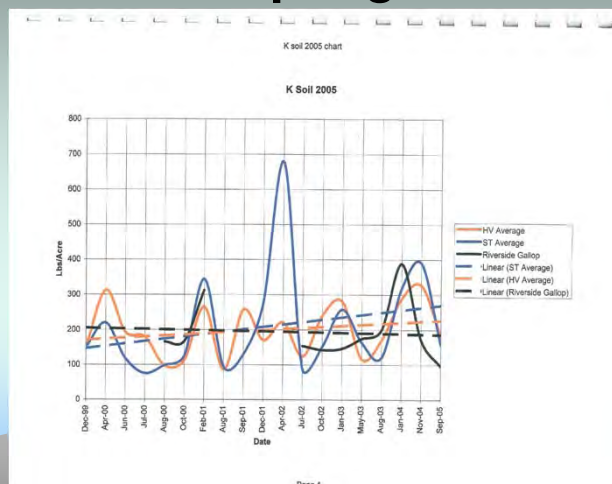
Nematode Assay

Sample	Root Knot	Lance	Lesion	Stubby Root	Ring	Stunt	Spiral
Treatment Threshold	80	40	51	150	500	100	1000
Sample N1/1 HV – Home Straight New							
7/2003	20	6		2	92	4	
7/2004	360	4			88	24	8
11/2005	0	4			152		8
8/2006	6	30	0	8	82	30	340
8/2009	0	83	0	0	296	68	0
8/2010	0	0	0	2	47	0	4

QC 4 –Soil Sampling Testing

土壤測試

Soil Sampling : K 鉀

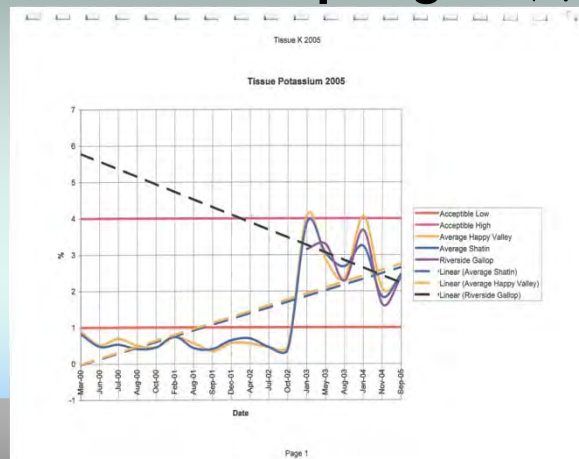


QC5 – Tissue Sampling Testing



組織測試

Tissue Sampling: K 鉀



Advances in Track Management 草地跑道管理回顧



- Unfavorable organic accumulation 跑道根生層老化問題
- Pythium disease management 綿腐病治療及預防
- Sand selection & design reinforced sand profile 結構沙層設計回顧及改善
- Surface stability, kick back, turf recovering & repairing techniques 改善沙網跑道穩定性及引進草坪修補技術

Advances in Track Mgt.



- Eleusine indica control 牛筋草控制
- Root mass management 草坪根部管理
- Nutrition management in sand profile 化學及養份管理
- Prescribing performance standard 建立跑道表現指標
- Managing surface hardness 管理硬化現象

Advances in Track Mgt.



- Water quality 水質
- Grass Species trials 草種測試
- Irrigation system refurbishment 灌溉系統更換
- Process reengineering 改善營運流程

Advances in Track Mgt.



- Managing reconstructed profile for consistency 管理重建跑道的物理性質
- OHSM 引入職安健系統
- Turfgrass transition & management 冬夏草交替管理
- Nematode control 線蟲控制
- Multi-skilled work force development 多元化技能培訓
- Year round racing: strategies on track maintenance 探討全年跑馬的場地維修策略

Advances in Track Mgt.



- Olympics sand & grass footing: design, construction & maintenance 協助奧運沙及越野場地設計,建造, 管理及運作
- Laser levelling techniques 引入雷射平水設定技術
- Turf block repairing technique 引進巨型草磚技術
- Asian Game sand footing construction and preparation 協助亞運馬術場地建造及保養

Advances in Track Mgt.



Current Focus 目前項目



- Evaluating TifGrand™ potential as a race track grass for shaded environment 評估耐陰的Tifgrand草種
- Alternate control product for nematode management 探討另類線蟲管理的方法或產品
- Evaluating different renovation approach to reduce surface hardness while maintaining surface stability
- 評估不同的維修方案的效果既能軟化跑道, 又不至另它鬆軟
- Subsurface organic Management 處理深層積聚的有機物

Turf Trial Area 草種試驗場



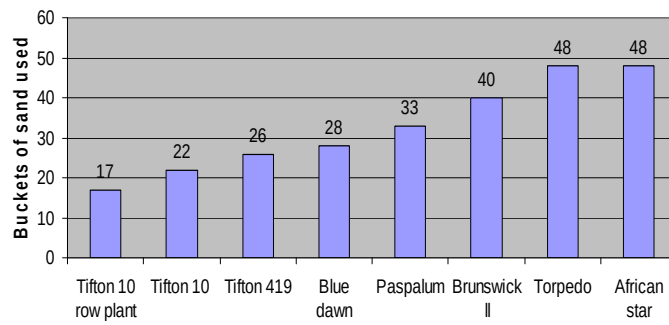
Future Challenge 將來的挑戰



- Alternate racetrack grass cultured under poor quality water: Seashore Paspalum 水源，質不足下能持續栽培的草種
- Low input & sustainable culture system 可持續的栽培模式
- Alternate yet effective plant protection products 另類但有效的植物保護方案及產品
- Seeding practice with short/ extreme transition window 在返常氣候下種植冬草的模式



Divot Assessment 28 Dec 2000



Buckets of sand used - "Paspalum vs Tifton 419"

