Improving Your Infield Skin

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Closer Look for Two Reasons
Injury Endemic

• 3.5 million children (<14) hurt annually playing sports

• Youth injuries (<14) cost the US public $49,192,781,832 in 1997

• Emergency room visits (2004)
  – 116,000 – baseball
  – 186,000 – football

Help the “non-artists”

• Document methods to change the quality of the surface

• Sometimes “feel” can be off
How do maintenance procedures affect baseball field playing quality?
Skinned Infield

Synthetic Turf

Natural Turfgrass

Skinned Infield
Initial Questions

• Key Factors?

• Variability?
<table>
<thead>
<tr>
<th>MLB</th>
<th>Professional</th>
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<tbody>
<tr>
<td>[Image]</td>
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<tr>
<td>NCAA</td>
<td>Municipal</td>
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Survey Conclusions
Skinned Infield

• HARD

• Soil Texture & P.S.A.

• Consistent 75:25 ratio

• Coarse-to-Fines
Similar Mixes

Why do fields perform differently?

Maintenance
Plot Construction
(4-in depth)
Plot Construction
Bulk Density (g/cm$^3$)

High = 1.8
Medium = 1.7
Low = 1.5
Skinned Area Will Become Compacted

- Construction
- Traffic
- No turfgrass here
Calcined Clay
(tons/10,000 ft$^2$)
$\frac{1}{4}$ in incorporated, topdressing

0.5  1.0
Grooming Depths

0.00  0.25  0.50  0.75
First Question

How do these practices change...
How fast the infield plays
CO$_2$ Powered Cannon

- Designed for Baseball
- Speeds 70 – 200 mph
25° Impact Angle
What do we find out?
Speed is all about the sub-surface
Compaction
Surface Treatments Don’t Affect Pace

Calcined Clay

Grooming < 0.75”
Second Question

How do these practices change....
The safety of the infield
Surface Hardness
Player-to-Surface

- Clegg Impact Hammer
- Gmax
- US Consumer Product Safety Commission
- Based on head impacts
- 3 sub-samples
Traction
Player-to-Surface

PENNFOOT
Cleats
Designed for Pitchers
Weight to 265-lb
Measure Rotational Traction
Grooming Reduces Hardness & Traction
What have we learned?

- Speed of the Infield
  - Sub-surface
  - Compaction
  - No surface trts

- Safety of the Infield
  - Compaction
  - Alter with Grooming
Irrigation
Consulted the Experts
Irrigation

• 2 inches, 14-hr prior to data collection

• Flood night before

• Pre-, post-game moisture (3-hr)
Weather Conditions

• Early April
  – Cool & not humid (51°F, 35% RH)

• Early June
  – Hot & not humid (84°F, 48 % RH)

• Mid-July
  – Hot & humid (86°F, 52 % RH)
Compacted Infields Take Longer To “Wet Up”

<table>
<thead>
<tr>
<th>Compaction</th>
<th>Moisture Content (%)</th>
</tr>
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<tbody>
<tr>
<td>High</td>
<td>11.5</td>
</tr>
<tr>
<td>Medium</td>
<td>13.3</td>
</tr>
<tr>
<td>Low</td>
<td>12.9</td>
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Surface is Graded

- Move rain water off the field
- Rain won’t move internally
- Applied irrigation works the same

~ ½ %
Compacted Water

~18% silt
~7% clay

Minimal internal drainage (porosity)
• Flooding allows slow infiltration
  • Once introduced
  • Moisture Retention
In April

- Cool, not humid (~51°F, 35% RH)

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<tr>
<th>Compaction</th>
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<th>Finish</th>
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<tr>
<td>High</td>
<td>11.3</td>
<td>11.3</td>
</tr>
<tr>
<td>Medium</td>
<td>11.6</td>
<td>11.4</td>
</tr>
<tr>
<td>Low</td>
<td>13.1</td>
<td>13.1</td>
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LSD (p ≤ 0.05) 0.5 0.5
In July

- Hot & humid (~86°F, 52 % RH)

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<td>High</td>
<td>13.9</td>
<td>12.7</td>
</tr>
<tr>
<td>Medium</td>
<td>15.3</td>
<td>14.3</td>
</tr>
<tr>
<td>Low</td>
<td>17.6</td>
<td>15.3</td>
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LSD (p≤0.05) 1.9 1.9
Move away from light, frequent
Move towards deep, infrequent
Calcined Clay
(tons/10,000 ft^2)
\(\frac{1}{4}\) in incorporated

0.5  1.0  0  1.5
Calcined Clay

• No effects on playing quality
• Did not measure:
  • Aesthetics (colorant)
  • Sliding / Ease of Dragging
  • Ability to remove standing water
  • Ability to deal with in-game rain
Calcined Clay

- No effects on playing quality
- No effect on VMC (3-in)

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<th>CC (tons/10,000 ft²)</th>
<th>VMC (%)</th>
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<tr>
<td>0.0</td>
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<tr>
<td>0.5</td>
<td>12.5</td>
</tr>
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<td>1.0</td>
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Color Change

- Dark to Light
  - Easily confused with "drying out"
Move towards deep, infrequent
Reduce day of game applications
Conclusions

• **Speed**
  - Sub-surface
  - Compaction
  - No grooming effect

• **Safety**
  - Compaction
  - Grooming

• **Calcined Clay**
  - No effects

• **Irrigation strategy**
  - Reduce labor/time input
Acknowledgements

- STMA
- Dr. Andy McNitt
- Tom Serensits & Dianne Petrunak
- Dave Livingston & crew
- Multiple Field Managers
- Pennsylvania Turfgrass Council
- Profile Products
- Diamond-Tex