Carrying Capacity

Richard Bonine
Rangeland Program Manager
Pueblo of Laguna
Carrying Capacity: Overview

- YOU ... are not a cowboy/cowgirl!

- YOU ... are a grass farmer!
Carrying Capacity: Overview

YOU... are a grass farmer!

-Grass/plants are a gift from Mother-earth which has the ability to convert sunshine into fiber and protein.
Carrying Capacity: Overview

YOU... are a grass farmer!

-Livestock are a gift from Mother-earth that converts grass to protein for our benefit and nourishment.
Accepting your role as a grass farmer is your part of helping the strength of the Father protect the gifts of Mother-earth.
Carrying Capacity: Overview

YOU... are a grass farmer!

While it might be interesting to talk about EPD’s, Genomics, and Super-cows...
The truth is if you don't accept your role as a grass farmer, Super-cow will starve to death. Why?
Carrying Capacity: Why?

YOU... are a grass farmer!

Accepting your role as a grass farmer means ensuring enough grass to provide adequate nutrition to livestock.
Carrying Capacity: Why?

YOU... are a grass farmer!

Accepting your role as a grass farmer means helping grass increase root reserves and increase soil organic matter.
Carrying Capacity: Why?

YOU... are a grass farmer!
Carrying Capacity: Why?

SOIL AND GRASS
NATURE GIVES US GRASS
SOIL FERTILITY
WATER CONSERVATION
STABILIZED SOIL TEMPERATURES
PLANT DEVELOPMENT

LOSS OF PLANT VIGOR
LOSS AND FUTURE RANGE PRODUCTION
NATURE CANNOT GIVE UP HER FERTILITY AND STILL PRODUCE GRASS
GRASS RECOVERY IS VERY SLOW

BARE GROUND RANCHING
FURTHER USE MEANS POINT MEANS
USE BEYOND THIS

CO2... CO2 Plant Weight
ABOUT 90% OF THE TOTAL VOLUME OF LIVESTOCK AND LIVESTOCK PRODUCTS FOR THE AVAILABILITY OF LIVESTOCK AND LIVESTOCK PRODUCTS

YOU... are a grass farmer!
Carrying Capacity: Why?

YOU... are a grass farmer!

Accepting your role as a grass farmer means reducing bare soil and addressing desertification.
Carrying Capacity: Why? YOU... are a grass farmer!

Accepting your role as a grass farmer means proactively protecting range resources. How?
Carrying Capacity: How?

YOU... are a grass farmer!

Grass farmers use the practices of Range Management to protect the earth.
Carrying Capacity: How?

YOU... are a grass farmer!

You can only manage things you measure.

Range Management requires Range Measurement.
Carrying Capacity: How?

1. Define the pasture or area you are using.

2. Establish Permanent Sample Points.
Carrying Capacity: How?
Carrying Capacity: How?
Carrying Capacity: How?

Collect production data.
Carrying Capacity: How?

Grass Farmer Math:
LBS/AC = Avg. Total Wt. of 10 clip-plots x Hoop Factor.

<table>
<thead>
<tr>
<th>1-m²</th>
<th>Feet²</th>
<th>8.921</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.96</td>
<td>0.96</td>
<td>100</td>
</tr>
<tr>
<td>1.92</td>
<td>1.92</td>
<td>50</td>
</tr>
<tr>
<td>2.4</td>
<td>2.4</td>
<td>40</td>
</tr>
<tr>
<td>4.8</td>
<td>4.8</td>
<td>20</td>
</tr>
<tr>
<td>9.6</td>
<td>9.6</td>
<td>10</td>
</tr>
<tr>
<td>96</td>
<td>96</td>
<td>1</td>
</tr>
</tbody>
</table>
Carrying Capacity: How?

Grass Farmer Math:
Total Production (TP)

TP (LBS/AC) = Avg. Total Wt. of 10 clip-plots x Hoop Factor

30.8g * 8.921 = 275 (LBS./AC)
Carrying Capacity: How?
Grass Farmer Math:
Max Carrying Capacity

\[ \text{MCC (LBS./AC)} = \frac{\text{TP}}{2}. \]

TAKE $\frac{1}{2}$ - LEAVE $\frac{1}{2}$

\[ \text{MCC} = \frac{275}{2} = 137.5 \text{ LBS./AC} \]
Carrying Capacity: How?

Grass Farmer Math:

Effective Carrying Capacity

\[
\text{ECC (LBS./AC)} = \text{MCC} \times 0.75
\]

\[
\text{ECC} = 137.5 \text{ LBS./AC} \times 0.75 = 103.1 \text{ LBS./AC}
\]
Carrying Capacity: How?
Grass Farmer Math: Shortcut

Total Production × 0.375 = ECC
Carrying Capacity: How?

Grass Farmer Math: \( \frac{AUM}{AC} \)

\( \frac{AUM}{AC} = \frac{ECC}{900} \)

\( \frac{AC}{AUM} = \frac{900}{ECC} \)

\( \frac{AUM}{AC} - \frac{103.1}{900} = 0.11 \frac{AUM}{AC} \)

\( \frac{AC}{AUM} - \frac{900}{103.1} = 8.7 \frac{AC}{AUM} \)
Carrying Capacity: How?

Grass Farmer Math: Stock Rate = \( \frac{\text{AUM}}{\text{AC}} \times \text{Ac in grazing area} \)

\[
500 \text{Ac} \times 0.11 \text{Ac/AUM} = 55 \text{ AUM}
\]
Carrying Capacity: How?

Grass Farmer Math: AUM/AC

Cattle spend 8 hr/day grazing or 240 hr/mo.

AUM/AC \times 240 = \text{hours on 1 acre}

0.11 \times \text{AUM/AC} \times 240 = 26.4 \text{ hours}. 
Grass farmers keep their animals herded together to maximize efficiency and effectiveness.
### Carrying Capacity: How?

109 Animal Units for 1 month

<table>
<thead>
<tr>
<th>Pasture</th>
<th>Ac</th>
<th>Avg. Wt. (g)</th>
<th>Hoop Factor</th>
<th>TP (LBS./AC)</th>
<th>MCC (LBS./AC)</th>
<th>ECC (LBS./AC)</th>
<th>Grazing Hours (AC)</th>
<th>Stocking Rate (AUM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>500</td>
<td>30.8</td>
<td>8.921</td>
<td>275</td>
<td>137.5</td>
<td>103.1</td>
<td>0.11</td>
<td>26.4</td>
</tr>
<tr>
<td>Red</td>
<td>1200</td>
<td>10.7</td>
<td>8.921</td>
<td>95</td>
<td>47.5</td>
<td>35.6</td>
<td>0.04</td>
<td>9.6</td>
</tr>
<tr>
<td>Green</td>
<td>190</td>
<td>16.4</td>
<td>8.921</td>
<td>146</td>
<td>73</td>
<td>27.3</td>
<td>0.03</td>
<td>7.2</td>
</tr>
</tbody>
</table>