Next Steps: University & State Programs
A Virtual Renewable Energy Education Field Day
October 26, 2011

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NM, TX and AZ – 3rd largest milkshed!

(milk production in millions of lbs)

- #1 California: 39,512
- #2 Wisconsin: 25,239
- New Mexico, Texas and Arizona: 20,820
- #3 New York: 12,424
- #4 Idaho: 12,150
- #5 Pennsylvania: 10,551
- #6 Minnesota: 9,019
- #7 Texas: 8,840
- #8 Michigan: 7,968
- #9 New Mexico: 7,904
- #10 Washington: 5,561
- #13 Arizona: 4,076

NM, TX and AZ produce 11% of US milk with 10% of the cows!

New Mexico, Texas and Arizona combined: #3 nationally!

Source: 2010 Milk Production Report, USDA
**U.S. Top 5 – Average cows per herd**

<table>
<thead>
<tr>
<th>Rank</th>
<th>State</th>
<th>Average Herd Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New Mexico</td>
<td>2,167</td>
</tr>
<tr>
<td>2</td>
<td>Arizona</td>
<td>1,609</td>
</tr>
<tr>
<td>3</td>
<td>California</td>
<td>987</td>
</tr>
<tr>
<td>4</td>
<td>Colorado</td>
<td>946</td>
</tr>
<tr>
<td>5</td>
<td>Idaho</td>
<td>917</td>
</tr>
</tbody>
</table>

- **Average herd size in US:** 167

Source: 2010 Milk Production Report, USDA

New Mexico State University
**U.S. Top 5 – Milk per Cow**

- 1. New Mexico: 24,320
- 3. Colorado: 23,089
- 4. Arizona: 23,028
- 5. Michigan: 22,445

- Average US milk per Cow: 20,567

- Arkansas: 12,615
- Louisiana: 11,870

Source: 2010 Milk Production Report, USDA
**U.S. Top 10 – Number of Dairies**

- 1. Wisconsin 13,170
- 2. Pennsylvania 7,400
- 3. New York 5,470
- 4. Minnesota 4,700
- 5. Ohio 3,310
- 6. Michigan 2,310
- 7. Iowa 1,890
- 8. California 1,820
- 9. Indiana 1,680
- 10. Missouri 1,740

Source: 2010 Milk Production Report, USDA

New Mexico: was 180 dairies today 158?
Where is the milk in New Mexico?
(August 2011)

<table>
<thead>
<tr>
<th>County</th>
<th>No. Producers</th>
<th>Milk Cows</th>
<th>Milk production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaves</td>
<td>35</td>
<td>82,000</td>
<td>24.0%</td>
</tr>
<tr>
<td>Curry</td>
<td>26</td>
<td>87,000</td>
<td>22.2%</td>
</tr>
<tr>
<td>Roosevelt*</td>
<td>37</td>
<td>57,000</td>
<td>20.6%</td>
</tr>
<tr>
<td>Dona Ana</td>
<td>22</td>
<td>40,000</td>
<td>12.2%</td>
</tr>
<tr>
<td>Lea</td>
<td>13</td>
<td>19,000</td>
<td>7.6%</td>
</tr>
<tr>
<td>Socorro</td>
<td>8</td>
<td>11,000</td>
<td>3.1%</td>
</tr>
<tr>
<td>Luna</td>
<td>3</td>
<td>6,000</td>
<td>2.7%</td>
</tr>
<tr>
<td>Valencia</td>
<td>5</td>
<td>7,000</td>
<td>2.4%</td>
</tr>
<tr>
<td>Eddy</td>
<td>3</td>
<td>6,000</td>
<td>2.4%</td>
</tr>
<tr>
<td>Bernalillo</td>
<td>4</td>
<td>3,000</td>
<td>0.9%</td>
</tr>
<tr>
<td>Other Counties Total*</td>
<td>2</td>
<td>-</td>
<td>1.8%</td>
</tr>
<tr>
<td>New Mexico Total</td>
<td>158</td>
<td>318,000</td>
<td>100%</td>
</tr>
</tbody>
</table>
Economic Impact of Dairy Processing and Milk Production in the Southwest
Terry L. Crawford, Carlos Mayen-Solórzano, and G. Robert Hagevoort
(2011, unpublished data)

• Direct, Indirect, & Induced Economic Effects Attributed to the Southwest Dairy Industry (NM, TX, OK, AZ)

<table>
<thead>
<tr>
<th>Impact Type</th>
<th>Output ($)</th>
<th>Employment</th>
<th>Labor Income ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effects</td>
<td>7,572,367,000</td>
<td>9,343</td>
<td>648,001,741</td>
</tr>
<tr>
<td>Indirect Effects</td>
<td>7,102,664,181</td>
<td>31,140</td>
<td>1,668,227,564</td>
</tr>
<tr>
<td>Induced Effects</td>
<td>2,224,312,875</td>
<td>16,999</td>
<td>714,956,220</td>
</tr>
<tr>
<td>Total Effects</td>
<td>16,899,344,056</td>
<td>57,482</td>
<td>3,031,185,525</td>
</tr>
</tbody>
</table>
MILK PRODUCTION vs. MILK COW INVENTORY
Average Annual Inventory, U.S.

Livestock Marketing Information Center
Data Source: USDA/NASS

Efficiency!
## Dairy farms, milking cows, and milk production
### August 2011 vs. 05/06.

<table>
<thead>
<tr>
<th>County</th>
<th>No. Producers</th>
<th>Difference from 05/06</th>
<th>Milk Cows(^1)</th>
<th>Difference from 05/06</th>
<th>Milk (Million lbs.)(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaves</td>
<td>35</td>
<td>-4</td>
<td>82,000</td>
<td>-8,000</td>
<td>162,540,189</td>
</tr>
<tr>
<td>Curry</td>
<td>26</td>
<td>+2</td>
<td>87,000</td>
<td>+20,000</td>
<td>150,509,839</td>
</tr>
<tr>
<td>Roosevelt*</td>
<td>37</td>
<td>-4</td>
<td>57,000</td>
<td>-8,000</td>
<td>139,864,458</td>
</tr>
<tr>
<td>Dona Ana</td>
<td>22</td>
<td>-2</td>
<td>40,000</td>
<td>-13,000</td>
<td>82,704,138</td>
</tr>
<tr>
<td>Lea</td>
<td>13</td>
<td>-1</td>
<td>19,000</td>
<td>-6,000</td>
<td>51,222,684</td>
</tr>
<tr>
<td>Socorro</td>
<td>8</td>
<td>+1</td>
<td>11,000</td>
<td>-</td>
<td>21,085,233</td>
</tr>
<tr>
<td>Other Counties Total*</td>
<td>2</td>
<td>-1</td>
<td>-</td>
<td>-</td>
<td>12,098,000</td>
</tr>
<tr>
<td>New Mexico Total</td>
<td>158</td>
<td>-14</td>
<td>318,000</td>
<td>-22,000</td>
<td>676,720,593</td>
</tr>
</tbody>
</table>

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1. NMDA as of January 1, 2010.
2. Million lbs. for August 2011 (NASS)

Average monthly production from April 05 to April 06 was 593,086,147 lbs.;

That is 12.4% more milk with 6.5% less cows!

New Mexico State University
Carbon Footprint of the Average U.S. Dairy Cow Has **Doubled** Since 1944

Adapted from Capper et al. (2008) ADSA-ASAS Annual Meeting, JDS 91 (E-suppl1) LB3

New Mexico State University
Carbon Footprint of a Gallon of Milk Has Been **Reduced by 2/3** Since 1944

Adapted from Capper et al. (2008) ADSA-ASAS Annual Meeting, JDS 91 (E-suppl1) LB3

New Mexico State University
Increased Production = Increased Efficiency

Increased CO₂ equivalency per gallon of milk with increased daily milk production. Adapted from Capper et al. (2008) PNAS.
Capper’s et al work in ‘08 and ‘09 was confirmed by the Innovation Center for US Dairy in 2010:

The Center collected data from a large number of US Dairies and calculated the actual Carbon Footprint for Fluid Milk (“Cradle to Grave”):

“The Fluid Milk Carbon Footprint Study validates that U.S. dairy accounts for approximately 2% of total U.S. greenhouse gas emissions. This is far less than the often misused 18% which is the Food and Agriculture Organization’s estimate for global livestock.”

Presented at LCA Food 2010, Sept. 22, 2010
(VII International Conference on Food LCA)
Efficiency of Managing Nutrient Flows:

Closed Loop Technology: Including - digesters, algae, aquaculture, hydroponics, etc.

We have the pieces – we’re missing the $ to do the work!
Why: 1. Reduce Environmental Impact
   2. Reduce Environmental Compliance Costs

Equals about 50cts/hd/d

Source: Hagevoort 2010, unpublished data
Where is the NM Dairy & other Biomass?

Dairy Biomass can act as an “anchor” feedstock supply
...for a regional biorefinery system which can in turn utilize the state’s other variable and seasonal Biomass supplies

Future local Biomass
• Chili and Cotton residues
• Tumble weeds?

Concentrations of dairies in NM

New Mexico State University
Southern Great Plains Dairy Consortium

- Southern Great Plains Dairy Consortium was established (2007)
- Consortium is the framework for coordinating Research & Extension and Teaching efforts
- Research & Extension –
  - producer identified issues
  - leverage expertise across participating universities
  - leverage research equipment and facilities across participating universities
- Teaching –
  - leverage knowledge and expertise to advance students in hands-on large herd management class
Southern Great Plains Dairy Consortium

• Supporters:
  – Dairy Producers of New Mexico (DPNM)
  – Texas Association of Dairymen (TAD)
  – United Dairymen of Arizona (UDA)
  – Dairy Farmers of America (DFA)
  – Select Dairy Producers
  – Lone Star Milk Producers
  – DairyMax
  – Southwest Dairy Museum
Southern Great Plains Dairy Consortium

- Participants:
  - NMSU Extension & Experiment Station
  - Texas AgriLife Research & Extension Service
  - West Texas A&M University
  - Texas Tech University
  - Tarleton State University
  - University of Arizona
  - Oklahoma State University
  - USDA – Agricultural Research Service
  - Texas Veterinary Medical Diagnostic Lab
Southern Great Plains Dairy Consortium

- Focus areas as defined by producers:
  - Environmental Quality
  - Dairy Production
  - Dairy Products & Milk Quality
  - Human Resource Development
  - Water Utilization
  - Energy Resources
  - Economics & Marketing
  - Resources for Industry
Southern Great Plains Dairy Consortium

• $1.0M in Grant Funding since ’07:
  – Air Quality - expansion of NAEMS
  – Water Usage
  – Economic Impact – producers & processors
  – Expansion of NMPF/DMI’s Lifecycle Analysis
  – Air Emissions Study (expansion from yr. 1)
  – Lagoon Seepage Study
  – Water Use Study (expansion from yr. 1)
  – AD Decision Support Tool
  – Extension Component for Repro Study
  – Herdsman Short Course Series
  – Assessing Blood Metabolites Profile Study
  – Dairy Employee Safety Training Development
Southern Great Plains Dairy Consortium

✓ Biomass
✓ Collaboration and support from producers
✓ Collaboration and support from allied industries
✓ Academic infrastructure and expertise
✓ Multi-state, multi-university, multi-disciplinary

✓ Have not been able to find the funding to support the R&D to develop the pieces ("suites of technologies") to develop a Closed Loop System!

✓ Digester - kind, design, size: producing: heat, CO2, N & P
✓ Algae - kind, design, size: utilizing: heat, CO2, N & P
✓ Aquaculture - kind: utilizing: heat, water
✓ Hydroponics - kind: utilizing: heat, water
✓ Dairy - clean water returned to dairy.
Thank You!
Robert Hagevoort
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