Food Systems Resiliency Spotlight Series Webinar #10

Please review the details about how everything will work today until we begin at 10:00 AM.

- This event will be recorded for educational or promotional use by the University of California.
- You will be muted throughout to prevent background noise.
- **Use the “Chat” for non-question conversations or comments.** Be sure to change the “To” if needed to ensure your Chat is sent to those who you want to send it to.
  
  **Options:**
  
  “All Panelists” if want to send a Chat only to the speakers
  
  “All Panelists and Attendees” for everyone to see your Chat message

- **Please post your questions** in the “Q&A.” Questions will be addressed at the end of the program.

**UNIVERSITY OF CALIFORNIA**
Agriculture and Natural Resources
Food Systems Resiliency Webinar Series

UC ANR Strategic Initiatives joint effort to reimagine our food system

UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Production
Processing
Accessibility
Food Systems Resiliency Series objectives:

Tour different parts of the Food System to:

- Improve knowledge and understanding
- Identify and share available existing electronic information (resource kits)
- Identify information gaps
Jennifer Heguy
Dairy Advisor in Stanislaus, San Joaquin and Merced Counties

Ed DePeters
Professor, Animal Science Dept., UC Davis

Josh Davy
Livestock and Natural Resources Advisor, Tehama County
California Cattle – Sustainability in Action!

Jennifer Heguy – UC Cooperative Extension Farm Advisor
Merced, Stanislaus & San Joaquin Counties
County Director, Stanislaus

Food Systems Resiliency Spotlight Webinar Series, November 24, 2020, Virtual
Ruminants
POP QUIZ
What Am I?
What Am I?

Dried Distiller’s Grains
What Am I?
What Am I?

Whole Cottonseed
What Am I?
What Am I?

Almond Hulls
Thank You!

Jennifer Heguy
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(209)525-6800

Food Systems Resiliency Spotlight Webinar Series, November 24, 2020, Virtual
Almond Hulls Composition & Feeding Amounts

Ed DePeters
Animal Science Department
University of California at Davis
Team Effort

- Almond Board CA, BioMass
  (Mr. Guangwei Huang & Dr. Karen Lapsley)
- Jed Asmus, January Innovations (ARPAS)
- Jennifer Heguy, UC Cooperative Extension (ARPAS)
- UC Davis
  - Hannah Bill (technician)
  - Katie Swanson (postdoctoral)
  - Staff at Dairy Facility & Feed Mill
  - Student Interns
Almond Hulls (AH)

- Almond (**Prunus dulcis**) belongs to the family **Rosaceae** that is related to stone fruits including peaches & cherries.
- Hull is anatomically similar to the fleshy portion of the peach we eat.

- Hull is anatomically similar to the peach we eat.
Milk cows in CA fed 5 lb As Fed almond hulls
2017: 2.44 million Tons of hulls!!
Objectives

• (1) Evaluate feeding high amounts of almond hulls (AH) to lactating cows.

• (2) Determine the impact of foreign debris, shells and sticks, on quality (chemical composition & digestibility). "Variability"
Lactation Study

• 12 lactating Holstein cows

• **Treatments**: 0, 4, 8, or 12 lb AH/cow daily

• Production performance:
  milk yield
  milk composition
  feed intake & digestibility

**AVG = 5 lb AH/cow**
Composition of Almond Hulls

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Sugars (H₂O)</td>
<td>34.7</td>
<td>2.24</td>
<td>31.8</td>
<td>37.2</td>
</tr>
<tr>
<td>% Sugars (EtOH)</td>
<td>32.0</td>
<td>2.16</td>
<td>29.7</td>
<td>34.1</td>
</tr>
<tr>
<td>% Fiber (CF)</td>
<td>14.9</td>
<td>1.77</td>
<td>13.8</td>
<td>17.5</td>
</tr>
<tr>
<td>% Fiber (NDF)</td>
<td>23.8</td>
<td>2.04</td>
<td>22.2</td>
<td>26.6</td>
</tr>
<tr>
<td>% Protein</td>
<td>4.5</td>
<td>0.24</td>
<td>4.2</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Almond hulls:
- excellent source of digestible carbohydrate (sugars) – energy for cow
- good source of fiber – rumen function & energy
- poor source of protein

CF As Is basis = 12.78%

N = 4 samples
### Summary Production

<table>
<thead>
<tr>
<th>Item (lb/d)</th>
<th>0 lb AH</th>
<th>4 lb AH</th>
<th>8 lb AH</th>
<th>12 lb AH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed Intake, lb/d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.0</td>
<td>60.1</td>
<td>58.1</td>
<td>58.6</td>
<td></td>
</tr>
<tr>
<td>Milk, lb/d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85.4</td>
<td>86.5</td>
<td>81.2</td>
<td>82.9</td>
<td></td>
</tr>
<tr>
<td>Fat, %</td>
<td>3.81&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.78&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.95&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.97&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Protein, %</td>
<td>3.46&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.43&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.35&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.33&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

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**Total Minutes per 24 hours**

- **Rumination**
  - 0 lb AH: ~450 minutes
  - 4 lb AH: ~500 minutes
  - 8 lb AH: ~550 minutes
  - 12 lb AH: ~600 minutes

- **Eating**
  - 0 lb AH: ~150 minutes
  - 4 lb AH: ~200 minutes
  - 8 lb AH: ~250 minutes
  - 12 lb AH: ~300 minutes

**Why?**
Field Weight Yields

Commercial almonds hulls contain hulls, sticks & shells

Total Debris (Hulled) = Sticks + Shells

Figure is from Environmental Protection Agency. Food & Agricultural Industry 2017
## Composition of Total (Commercial) & Pure AH

<table>
<thead>
<tr>
<th>Item</th>
<th>Nonpareil</th>
<th>Pollinators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Pure</td>
</tr>
<tr>
<td>% Sugars</td>
<td>32.6</td>
<td>33.6</td>
</tr>
<tr>
<td>% Fiber (CF AS Is)</td>
<td>12.7</td>
<td>11.0</td>
</tr>
<tr>
<td>% Fiber (NDF)</td>
<td>21.4</td>
<td>19.3</td>
</tr>
<tr>
<td>% Protein</td>
<td>5.1</td>
<td>5.1</td>
</tr>
<tr>
<td>% Lignin</td>
<td>8.6</td>
<td>7.6</td>
</tr>
</tbody>
</table>
Approaches

• **Total AH versus Pure AH**
  - *In sacco* “disappearance” ruminally fistulated cows
  - 0, 1, 2, 4, 8, 16, 32, 64 h
  - Rate & Extent of disappearance

Pure hulls (no sticks & shells) are more digestible – provide more energy to the cow for milk production.
Don’t Guess - Test

Dairy X

Dairy UCD
Violations for Almond Hulls

Almond Hulls are ≤ 15% CF As Is basis

50% Violations!!

17% CF
13% CF

% Violations % CF Violation % CF Legal

2014 2015 2016 2017 2018
Take Home Messages

1. AH (high quality) can be fed at high levels to lactating dairy cows.
2. Composition – Varies Greatly!!
3. Test the composition of your AH “Don’t Guess - Test”
4. AH are a byproduct feedstuff. Dairy cows convert the sugar and digestible fiber to milk for humans. Positive relationship between the almond growers and dairy farmers for the benefit of our environment.
Increasing the feeding value of rice straw

Josh Davy - UC Livestock and Range Advisor
Dan Macon
Betsy Karle
Morgan Doran
The culmination of 3 years
Challenge of the champions

• Wet straw – 50%+ moisture
  – In the past these treatments had increased intake
  – Based on the theory that quality declines as it dries

• Chopping
  – Processing low moisture straw with a flail mower does the work for the cattle

• Ammoniated and chopped straw
Treatments

- This year
  - Dry straw control
  - Dry straw ammonia
  - Wet straw control
  - Wet straw lactic acid
Treatments wrapped
Ammonia – 2% by wt
Feeding trial
Height, width, weight
60 day consumption by feeding

Intake per head

Feeding Period
- 1
- 2

Ammonium
High Moisture
Low Moisture
Average daily gain

![Graph showing period average daily gain for different treatments: Ammonia, High moisture, and Low moisture. The graph indicates that Low moisture treatment has the highest period average daily gain, followed by High moisture and Ammonia.]
Hip height

![Graph showing Period Hip height change for different treatments: Ammonia, High moisture, and Low moisture. The graph indicates higher values for Ammonia and Low moisture compared to High moisture.]
Crude protein
TDN

Graph showing the TDN values for different treatments.
Unexpected outcome!
Synopsis

• High moisture straw may be more than can be handled...

• Ammonia treatments significantly work after multiple years of testing
  – Move the probe or leave the wrapping loose

• Chopping also seems to help

• Other methods may not amount to a lot of benefit
Open Q & A
Polling question

Did the information provided improve your knowledge and understanding of how ruminants help keep our food costs reduced?

Yes definitely, somewhat, not much, does not apply
Polling question

Were the electronic resources new to you?

Yes definitely, somewhat, not much, does not apply
Polling question

Will you use information from today’s webinar with your clientele?

Yes definitely, somewhat, not much, does not apply
With gratitude and appreciation to all who have presented and participated in this series

STAY HEALTHY

Happy Thanksgiving