



University of California
Agriculture and Natural Resources

Making a Difference for California

Byproduct Trends & Opportunities for the California Dairy Industry

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Kearney Field Crops, Alfalfa & Forage Field Day, 2023

Why Byproducts?

- **Water & Forage Production**
 - Current & future water regulation
 - Reduced water availability
- **Commodity Deliveries**
- **Sustainability Conversations**



Today's Talk

Two Projects:

- 1. Byproduct feeding survey of California dairy nutritionists**
- 2. Almond Hulls**





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Survey of California dairy nutritionists on byproduct usage



Jennifer Heguy

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Objective & Methods

OBJECTIVE:

Byproduct feeding trends & opportunities

METHODS:

Electronic Survey

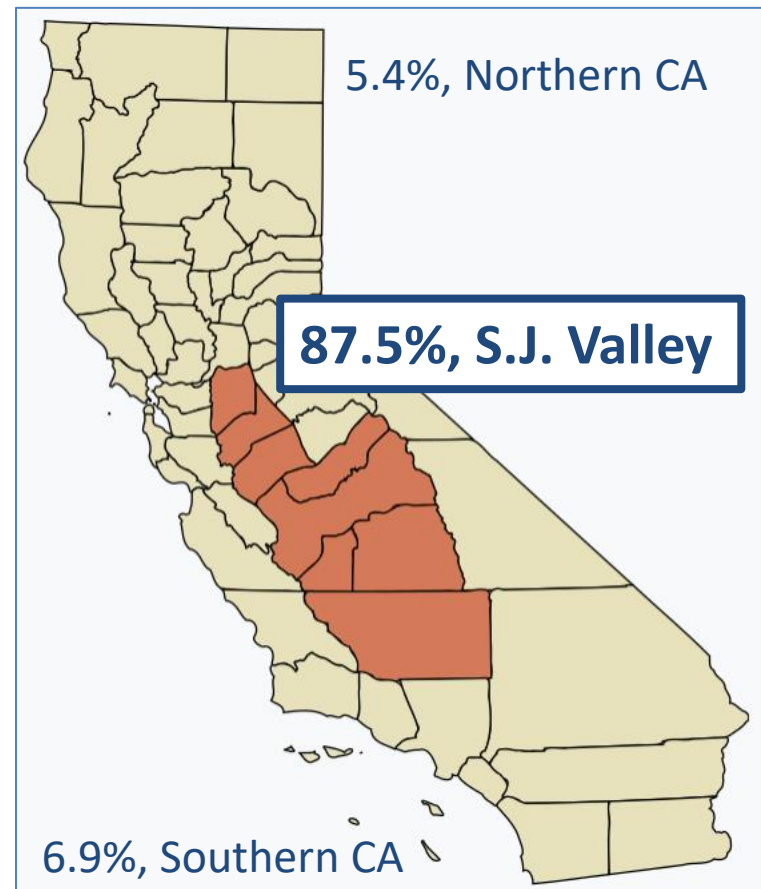
- California dairy nutritionists (n=61)



Demographics

California dairy nutritionists

- 26 returned surveys (43%)
- 498 dairies
- 936,700 lactating cows (n=25)



Results

Byproduct	Nutritionists (n=26)
1. Almond Hulls	25
1. Whole Cottonseed	25
3. Canola Pellets	24
3. Soybean Meal	24
5. Dry Distiller's Grains	23
6. Almond Hull & Shell	22
6. Canola Meal	22
6. Wheat Straw	22
9. Wheat Midds/Millrun	21
10. Corn Gluten Feed	20
10. Molasses	20



Feeding Levels



BYPRODUCT FEEDING LEVELS

Thinking across your California herds, what % of cows consume byproducts?

Lactating cows (%):

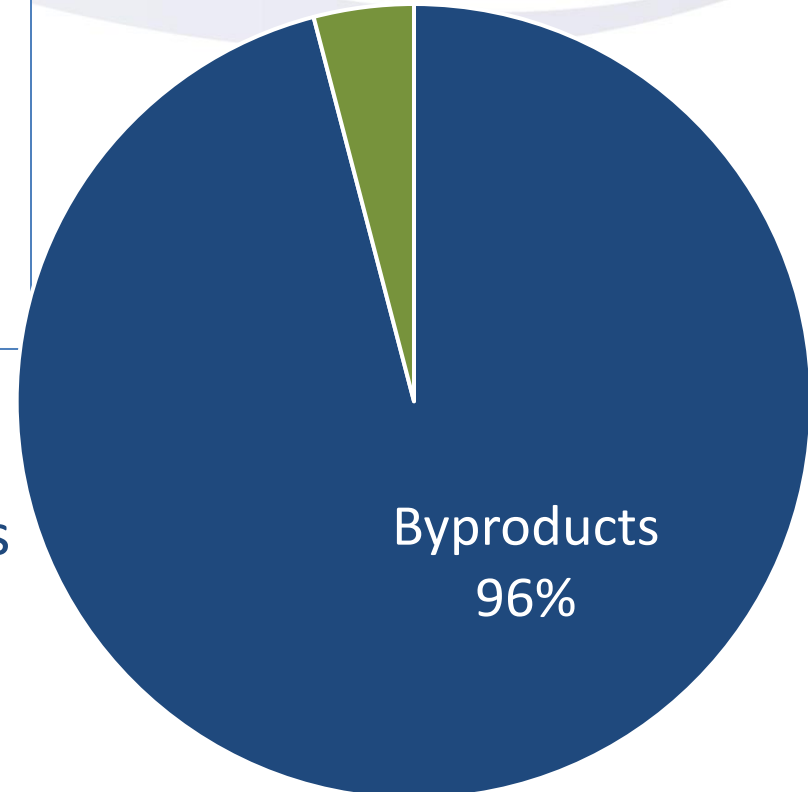
Feeding Levels



BYPRODUCT FEEDING LEVELS

Thinking across your California herds, what % of cows consume byproducts?

Lactating cows (%):



ALL lactating cows received byproducts

- 898,600 cows* (n=23)

DO NOT consume byproducts

- 38,100 cows (n=3)

Feeding Levels

UCDAVIS
UNIVERSITY OF CALIFORNIA

In your **LOWEST** byproduct fed herds, what % of the ration is byproducts (DM basis)?

UCDAVIS
UNIVERSITY OF CALIFORNIA

In your **HIGHEST** byproduct fed herds, what % of the ration is byproducts (DM basis)?

% LACTATING ration:

% DRY ration:

% HEIFER ration:

Feeding Levels

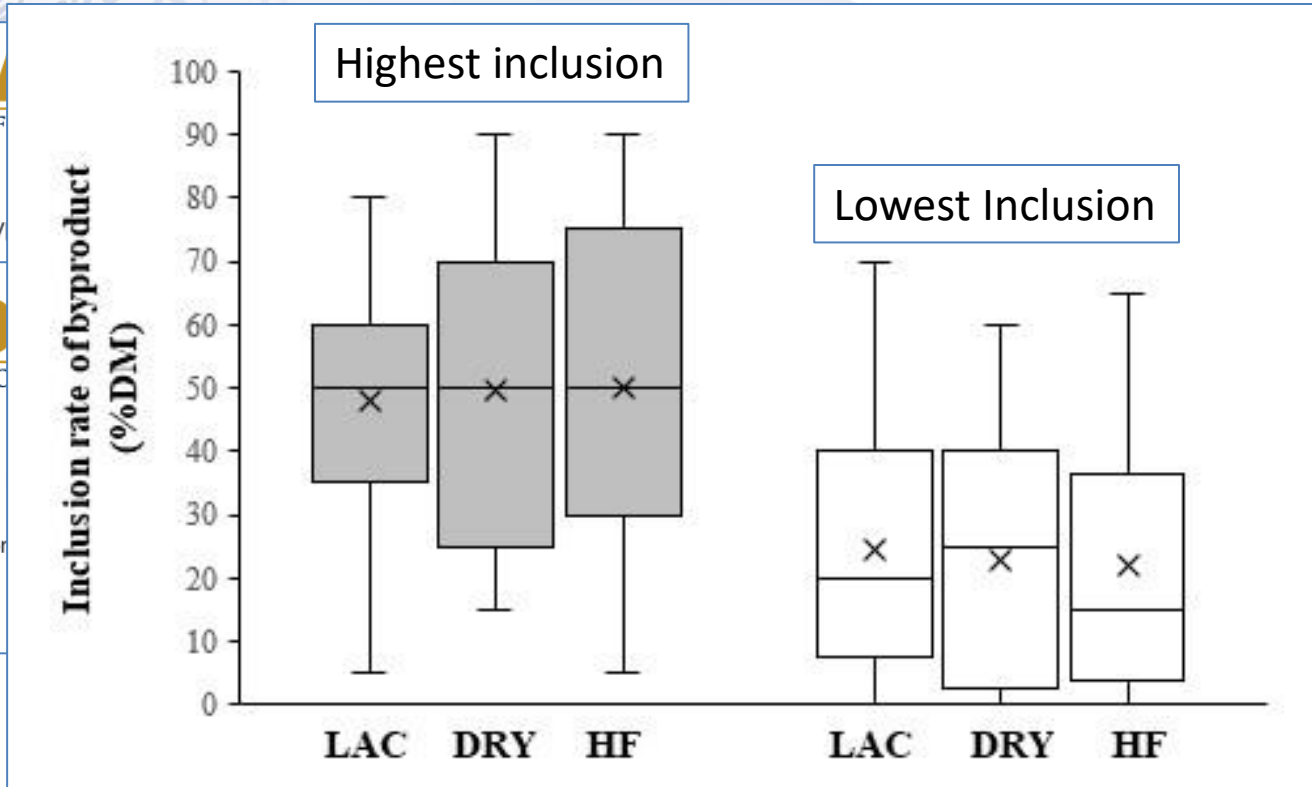
UCDA
UNIVERSITY OF CALIFORNIA

In your **LOWEST** by

UCD
UNIVERSITY OF CALIFORNIA

In your **HIGHEST**

% LACTATING ration:
% DRY ration:
% HEIFER ration:



Inclusion rate of byproducts (DM%) in lactating cow (LAC), dry cows (DRY), and heifer (HF) diets

Feeding Levels



On **AVERAGE** (across all your client herds), what % of the **ration** is byproducts (DM basis)?

% LACTATING ration:

% of the ration from byproducts, AVERAGE (all herds)

Weighted Average

Byproduct Inclusion Rate = 41%



BYPRODUCT MANAGEMENT

Why do you incorporate byproducts into rations (select all that apply)?

Price (they're cheap)

Availability

Value (they're worth the price)

Other:



BYPRODUCT MANAGEMENT

Why do you incorporate byproduct

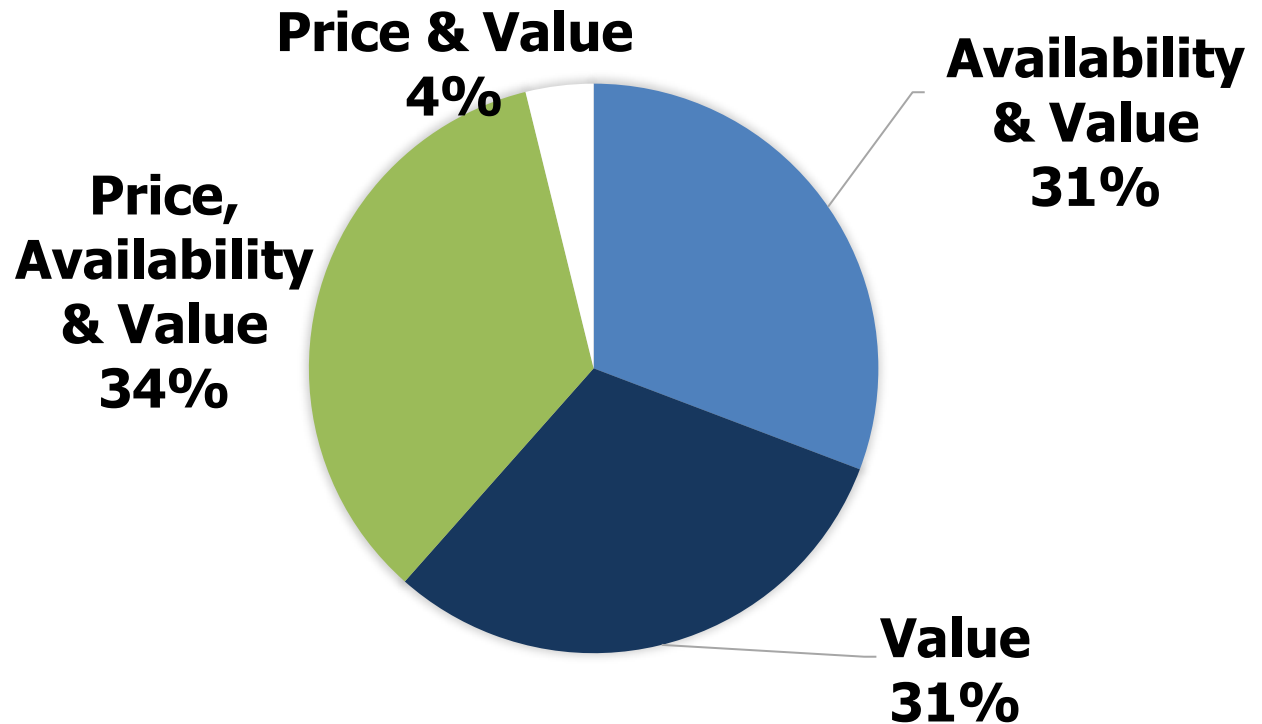
Price (they're cheap) **38%**

Availability **65%**

Value (they're worth the price)

100%

Other:





Do you replace forages with byproducts in **LACTATING** cow rations?

Yes

No

If yes, what are your most frequently used byproducts for replacing forages in **LACTATING** rations?

1.

2.

3.



Do you replace concentrates with byproducts in **LACTATING** cow rations?

Yes

No

If yes, what are your most frequently used byproducts for replacing concentrates in **LACTATING** cow rations?

1.

2.

3.



& concentrates

Do you replace forages with byproducts in **LACTATING** cow rations?

Yes	Forage, yes	96%
No	Concentrate, yes	96%

If yes, what are your most frequently used byproducts for replacing forages in **LACTATING** rations?

1.
2.
3.

Utilization



Concentrates	Forages
Citrus (14%)	Almond Hulls (40%)
Whey (12%)	Citrus (10%)
Millrun (10%)	Soybean Hulls (8%)

If yes, what are your most frequently used byproducts for replacing forages in **LACTATING** rations?

 & concentrates

- 1.
- 2.
- 3.

Usage Trends



BYPRODUCT USAGE TRENDS

How has your use of byproducts changed in the last 5 years?

Increased use

Decreased use

Use remained the same

Do you see byproduct usage changing in the next 5 years?

Yes, increased use

Yes, decreased use

No, usage will remain the same

Usage Trends



BYPRODUCT USAGE TRENDS

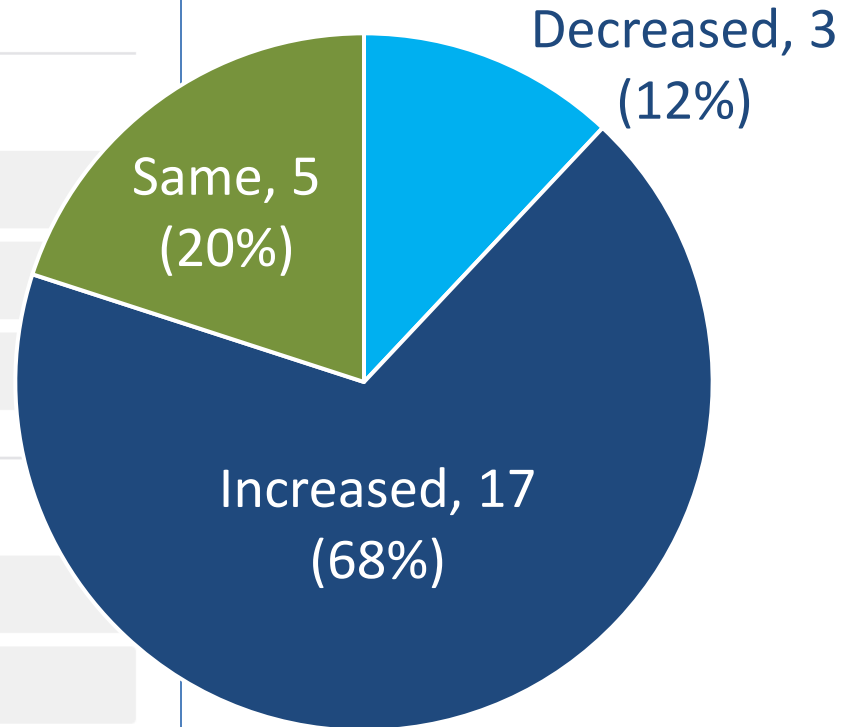
How has your use of byproducts changed in the last 5 years? n=25

Increased use	<input type="checkbox"/>
Decreased use	<input type="checkbox"/>
Use remained the same	<input type="checkbox"/>

Do you see byproduct usage changing in the next 5 years?

Yes, increased use	<input type="checkbox"/>
Yes, decreased use	<input type="checkbox"/>
No, usage will remain the same	<input type="checkbox"/>

Last 5 years



Usage Trends



BYPRODUCT USAGE TRENDS

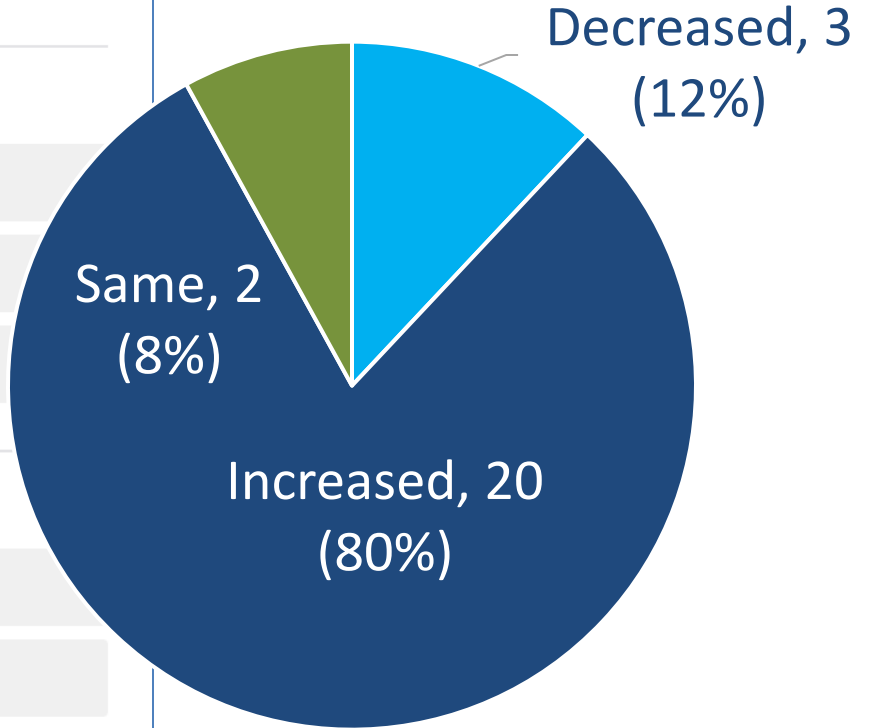
How has your use of byproducts changed in the last 5 years?

- Increased use
- Decreased use
- Use remained the same

Do you see byproduct usage changing in the next 5 years? n=25

- Yes, increased use
- Yes, decreased use
- No, usage will remain the same

Next 5 years



Take Homes

- **Results depict the sustainability & resiliency of the California feeding program**
 - **41% of the LACTATING ration (DM basis) is composed of byproducts**
- **Opportunities exist to increase byproduct inclusion rates in California dairy rations**
 - Large feeding range: 0-80%
 - Water availability; Current & future regulation; Other



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Almond Hulls in California

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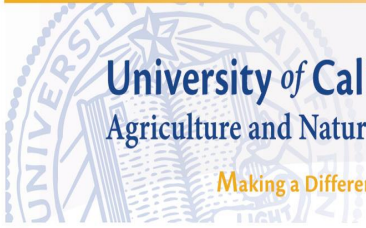
Almond Hulls

2019/2020 Almond Tree Fruit Weight, Crop Report

- Total weight generated: 8.23 billion lbs
 - Kernel weight: 2.55 billion lbs
 - **Hull weight: 4.03 billion lbs**
 - Shell weight: 1.65 billion lbs

CA dairies are the largest single consumer of almond hulls

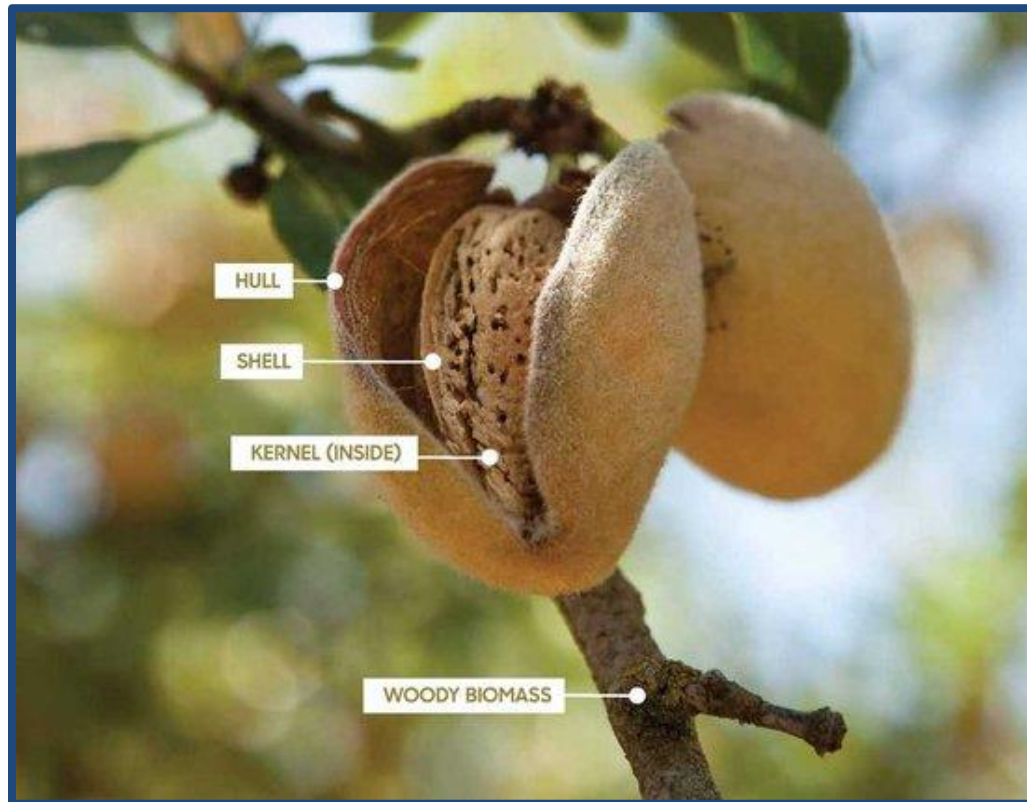




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Almond Hulls



Feeding Levels

On a lb/cow/day basis, what is the...

AVERAGE amount included in lactating cow rations:

- Average: 5 lbs/cow/day
- Range: 1 to 10 lbs/cow/day

MAXIMUM amount fed to lactating cows:

- Average: 10 lbs/cow/day
- Range: 2 to 18 lbs/cow/day



Feeding Levels

What is the...

MAXIMUM % included in lactating diets:

- Average: 15%
- Range: 0.8 to 30%

MAXIMUM % included in dry/growing diets:

- Average: 21%
- Range: 1.2 to 50%



Utilization

Choose how almond hulls are utilized in the following rations:

	Forage	Concentrate	Forage & Concentrate
Lactating Ration	30%	0%	70%
Dry Cow Ration	31%	7%	62%
Growing Ration	29%	9%	62%

Do changes in almond hull price affect utilization?

- 62%, Yes
- Mostly dependent on relation to forage/silage price

Conclusion

Opportunities exist to increase almond hull inclusion rates in California dairy rations

- Large range in feeding rates

Almond hull use likely to increase as water restrictions compromise forage production in California's San Joaquin Valley

Quality issues are a top concern

- Debris: stick & shell
 - Increases crude fiber
 - Decreases energy



Additional Info



Almond Hulls For Lactating Dairy Cows: Feeding Amounts & Composition

Ed DePeters, Katie Swanson, & Jennifer Heguy

Departments of Animal Science and Plant Sciences, & ANR

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Thank You



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Kearney Field Crops, Alfalfa & Forage Field Day, 2023

Almond Hulls

Composition of Almond Hulls: Nonpareil

Item DM basis	Total AH	Pure AH (no stick & shell)	Debris (stick & shell)
CF, %	14.6	13.0	44.4
CP, %	5.1	5.1	6.9
EtOH CHO, %	32.6	33.6	7.9
aNDF, %	21.4	19.3	62.3
NSC, %	32.9	34.0	8.3
NEL, Mcal/lb	0.71	0.74	0.47

Sticks & shells decreased the sugar and energy content.
Sticks & shells increased the fiber content.