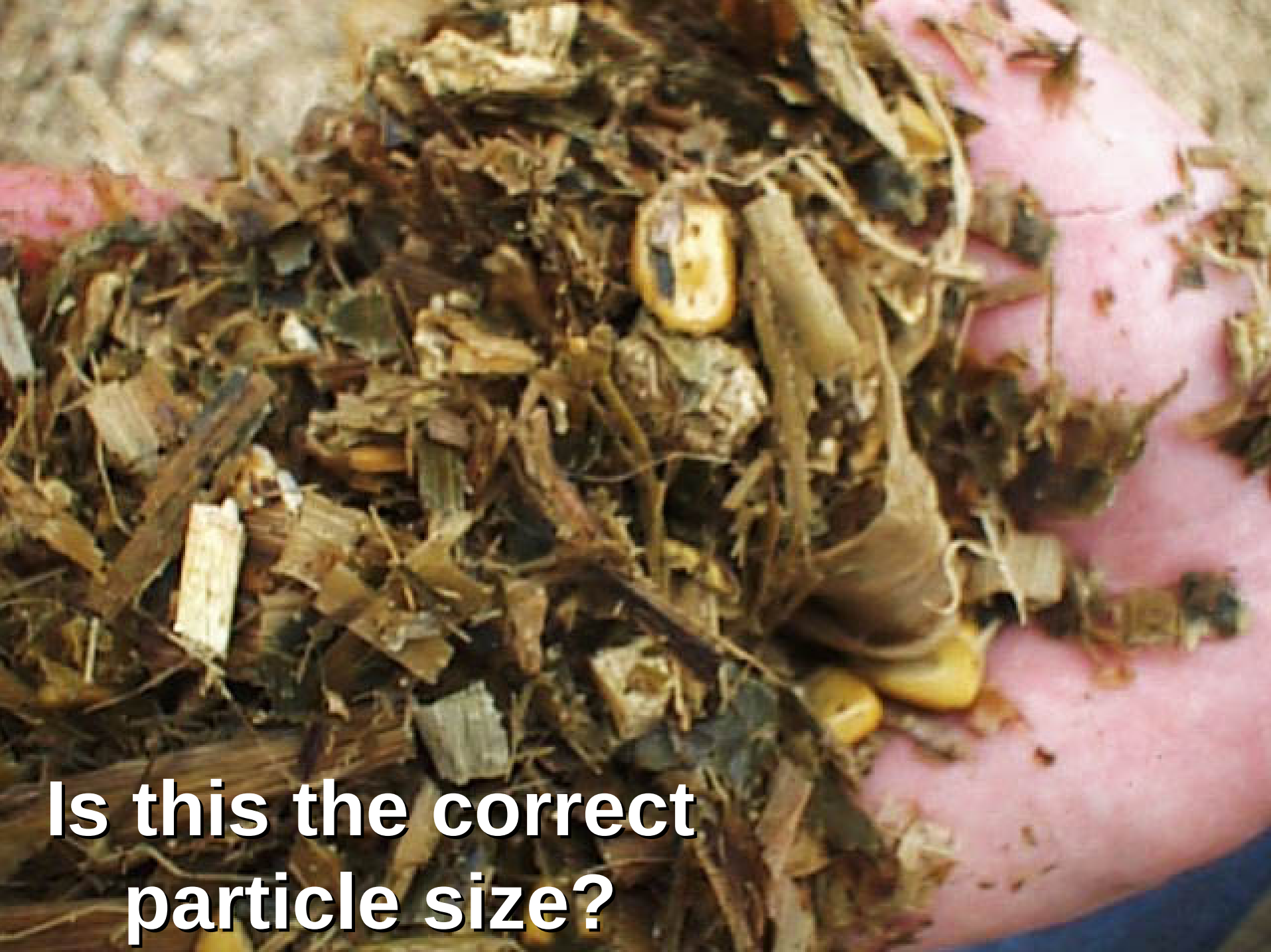
Evaluating Alfalfa and Corn Silage

Measuring Particle Size

Mike Hutjens
Extension Dairy Specialist
University of Illinois Extension


Is this the correct
particle size?

Today's Program

- Forage particle size and rumen function
- Measuring forage particles
- Grain particle size
- Manure particle size


Effective NDF
Chemical NDF

Physically effective fiber

- Providing 5 pounds of feed particles over 0.75 inch
- 550 to 600 minutes of cud-chewing activity per cow per day.
- 60 to 75% of cows at rest should be cud-chewing
- > 60 chews per bolus of feed.
- Rumen pH should be over 5.8
- > 2.2 parts acetate : one part propionate

Chemical NDF

- 28 to 32% of the total ration dry matter
- 1.2% of the cow's body weight as total NDF (1300 lb cow x 1.2 = 15.6 lb NDF divided by 30% = 52 lb of dry matter)

METHODS TO MEASURE EFFECTIVE FIBER

- Cud chewing per lb of DM (Georgia)
- 19 to 21% forage NDF (Wisconsin)
- Penn State Particle Box (Pennsylvania)
- USDA / Dairyland Lab / Pioneer corn silage starch availability in corn silage (Wisconsin)
- Calculate the amount of effective NDF (IL)

Penn State Separator

	Top	2nd	3rd	Bottom
	----------% (as fed)----------			
TMR	10-15	> 40	< 30	< 20
Haylage	> 40	> 40	<20	< 5
Corn silage	5-15	> 50	< 30	< 5

(3/4 TLC-Process)

Applying the Results
Penn State Box

Effective NDF = 100 - (% in bottom box)

Example:

Alfalfa Haylage with 52% in the bottom box

Effective NDF = 100 - 52

= 48% pe NDF-Penn

Applying the Results Penn State Box

Effective NDF = % in top two boxes

Bagged haylage	60%
Unprocessed corn silage	35%
Processed corn silage	70%
Tub ground hay	50%

Calculating NDF

30lb Hayl DM X 40% NDF = 12.0lb NDF

20lb Conc DM X 10% NDF = 2.0lb NDF

50lb Total DM 14.0lb NDF

14.0lb NDF/50lb DM = 28% NDF

Calculating eNDF

12.0lb NDF Hayl X 50% = 6.0lb eNDF

2.0lb NDF Conc X 10% = 0.2lb eNDF

14.0lb NDF 6.2lb eNDF

6.2lb eNDF/50lb DM = 12.4% eNDF

Guidelines for peNDF-UI

- Hay — 90 to 95%
- Processed hay (tub ground) — 40 to 65%
- Haylage — 40 to 80%
- Corn silage — 30 to 70%
- By-product feeds
  - Fuzzy cottonseed — 75%
  - Beet pulp, brewers — 35%
  - Soy hulls, distillers — 5%
- Grain
  - Ground corn — 5%
  - Cracked corn — 30%
  - Pelleted grain — 5%

Corn Silage Processing Score

- Sample of corn silage is placed on sieves and shaken for 10 minutes (Ro-Tap Shaker)
- Cost is $16 per sample of corn silage
- Not an on-farm field test at chopping
- After shaking, sub-samples are tested for starch (NIR or wet chemistry) compared to the total starch
  - Coarse (19, 13,9.5, 6.7, and 4.7 mm)
  - Medium (3.35, 2.36, and 1.18 mm)
  - Fine (0.6 or shorter)
- Guidelines for optimal processing
  - < 30 percent starch on the coarse screen
  - < 25 percent starch on fine screen

Results from 2003-2004

(166 CSPS samples at Dairyland Lab)

- Under processed 47%
  (over 50% starch in top)
- Average processed 44%
  (30 to 50% starch in top)
- Optimal processed 8%
  (under 30% starch in top)

Green Bay Packer Approach

- Put a sample of processed corn silage in a plastic tube with six inches of water
- Float off the plant parts
- Evaluate the corn kernels remaining in the bottom
  - All kernels processed / broken
  - Dry the sample and use grain screens to weigh fractions and determine percentages

If You Are Short of Functional or Physical Fiber

- If the Penn State Box indicates a form problem, add long forage particles
- If forages are too good, check indigestible NDF levels (40% *indig* NDF x 50 lb dry matter x 30% NDF = 6 lb of *indigestible* NDF) and add a source
- If you are short of chemical fiber, replace starch with NDF by-products (such as soy hulls, beet pulp, etc)

Using Wheat Straw

- When physically effective NDF is marginal
- When digestible NDF is over 60% for legumes and grass or corn silage is over 70%
- When fecal scores are low and appear related to a lack of effective fiber
- One lb of straw equals three lb hay
- Milk cow rations:
  - Start with one half pound per cow and monitor cow response
  - Maximum of 2 pound per cow
  - Processing to 1 to 2 inches in length

Grain Particle Size

Grain Particle Screens

Number 4	> 4500	Whole/coarse
Number 8	> 2200	Cracked corn
Number 16	> 1100	Ground corn
Number 30	> 500	Pig feed
Pan	< 500	Powder

How to Check a Grain Sample for Particle Size

Screen Size	----- Amount ---- Grams	Percent
# 4	4g	1%
# 8	74g	20%
#16	110g	29%
#30	160g	44%
Pan	24g	6%

Particle Size Guidelines

Screen Size	#4	#8	#16	#30	Pan
H.M. Corn (>30%)	75	25	0	0	0
H.M. Corn (25-30)	25	50	25	0	0
H.M. Corn (<25%)	0	<10	30	50	<20
Dry corn	0	<10	30	50	<20
Sample Shakeout	1	20	29	44	6

Shelled Corn Energy Values

	Mcal/lb DM
Cracked	0.84
Ground	0.89
High moisture	0.93
Steam flaked	0.93
High lysine	0.94
Finely ground	0.96

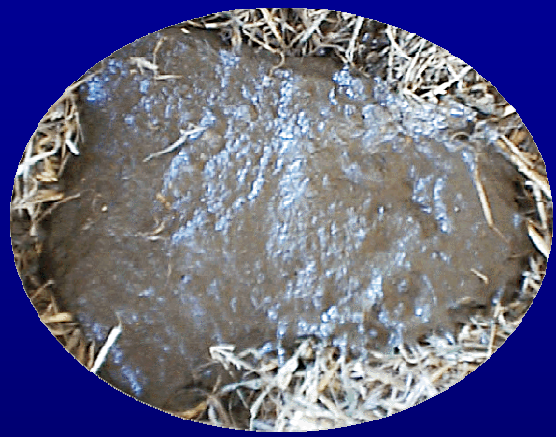
Dairy NRC 2001

Processing adjustment factor (PAF)

Steam flaked corn	1.04
H.M. corn	1.04
Bakery waste	1.04
Ground corn	1.00
Cracked corn	0.95
Corn silage, normal	0.94
Corn silage, mature	0.87

Manure Particle Size

MANURE MANAGEMENT



- Consistency
- Changes
- Screening

WASHING MANURE

- Use a number 6 or 8 screen
- Evaluate a cup of manure
- Use pressurized water
- Cows to evaluate
  - dry cows
  - fresh cows
  - high cows
  - high producing 1st lact cows
  - various groups of cows

MANURE SCREENING

- Rumen
  - Passage of split soybeans
  - Presence of whole cottonseed
- Processing
  - Appearance whole soybeans
  - Presence of whole corn seed
  - Presence of forage particles over 1/2”
- Combination of rumen and processing
  - Appearance of starch in corn seed


U.S.A. STANDARD TESTING SIEVE
A.S.T.M.E.-11 SPECIFICATION
OPENING MILLIMETER
2.36
NO. 8
OPENING IN INCHES
.0937
TYLER EQUIVALENT 8 MESH
FISHER SCIENTIFIC COMPANY
1-800-766-7000
MADE IN U.S.A.

Where to Order

- Penn State Box -- NASCO, Fort Atkinson, Wisconsin ($300 with scale)
- Screens--Seedboro Equipment Co 312-738-3700 (Chicago, IL) Five screens about $50 per screen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Questions?