

# The Importance of Monitoring Particle Size When Feeding Total Mixed Rations

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# Feeding Total Mixed Rations (TMR)



# Advantages of Feeding TMR

- Increase milk production, milk fat test
- Decrease feed costs
- Improve cow health
- Can include unpalatable feeds or feeds fed in small amounts
- Deliver consistent ration to cows every day

# Physical Characteristics of the TMR

- Amount, quality, type of forage
- Moisture content
- Level of NDF
- **Particle size**
- TMR mixing time

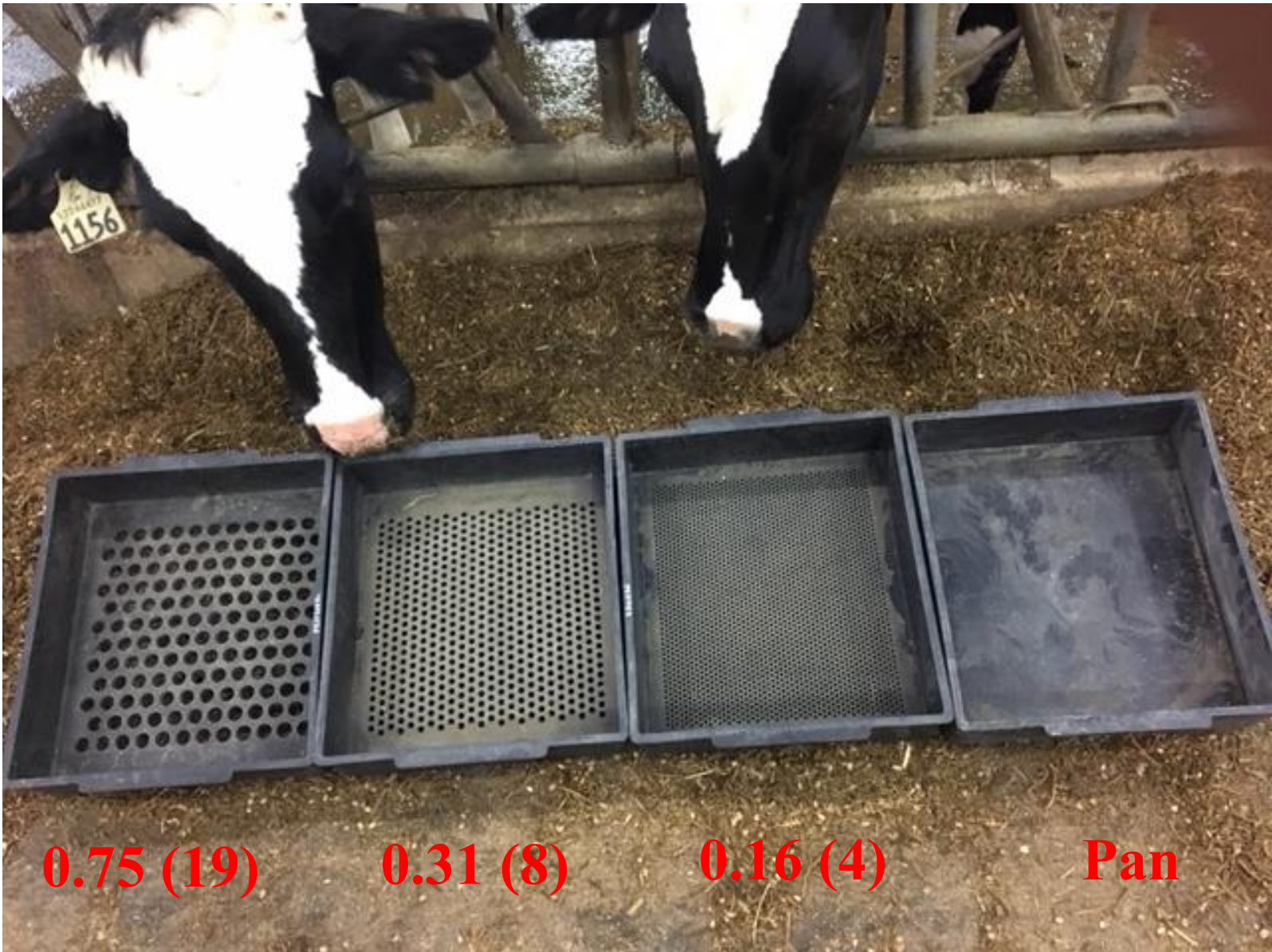
# TMR Particle Size

- Concept of physically-effective NDF (peNDF)
  - **Particle size** x NDF content
- Maintains rumen mat
  - Stimulates chewing, rumination
  - Saliva for rumen buffering
- Optimizes rumen fermentation
  - Stimulates appetite
  - Maximum production of volatile fatty acids
  - Maximum production of microbial production

# Penn State Particle Separator (Shaker Box)



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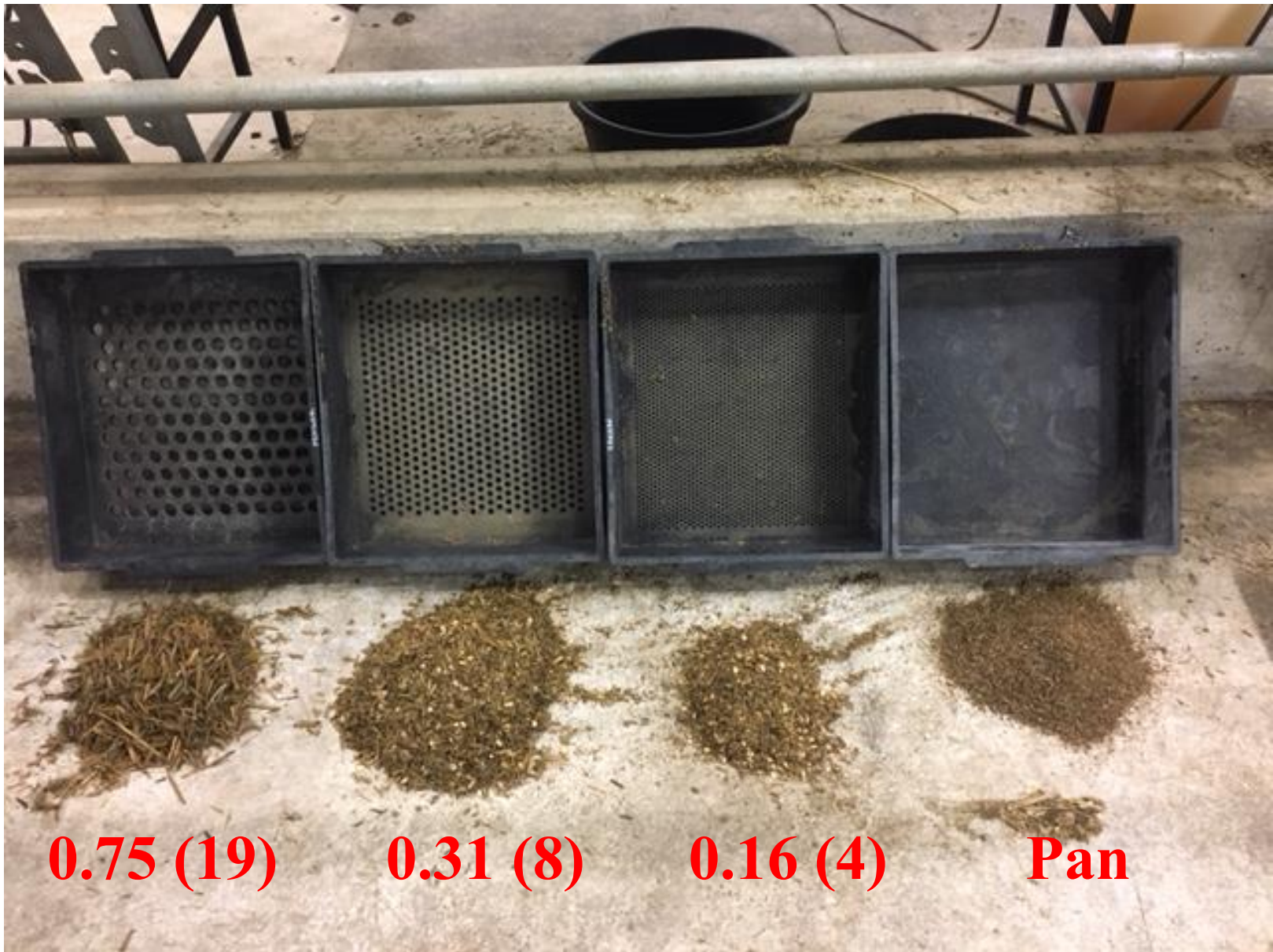
# Penn State Particle Separator (Shaker Box)



- PPS demonstration: <https://www.youtube.com/watch?v=d-vPe8QuE34>



# Penn State Particle Separator (Shaker Box)



# PSPS New Guidelines (4-mm screen)

Screen	Pore Size (Inches)	Particle Size (Inches)	TMR Target (%)
Upper Sieve	0.75 (19)	>0.75	2 to 8
Middle Sieve	0.31 (8)	0.31-0.75	30 to 50
Lower Sieve	0.16 (4)	0.16-0.31	10 to 20
Bottom Pan		<0.16	30 to 40

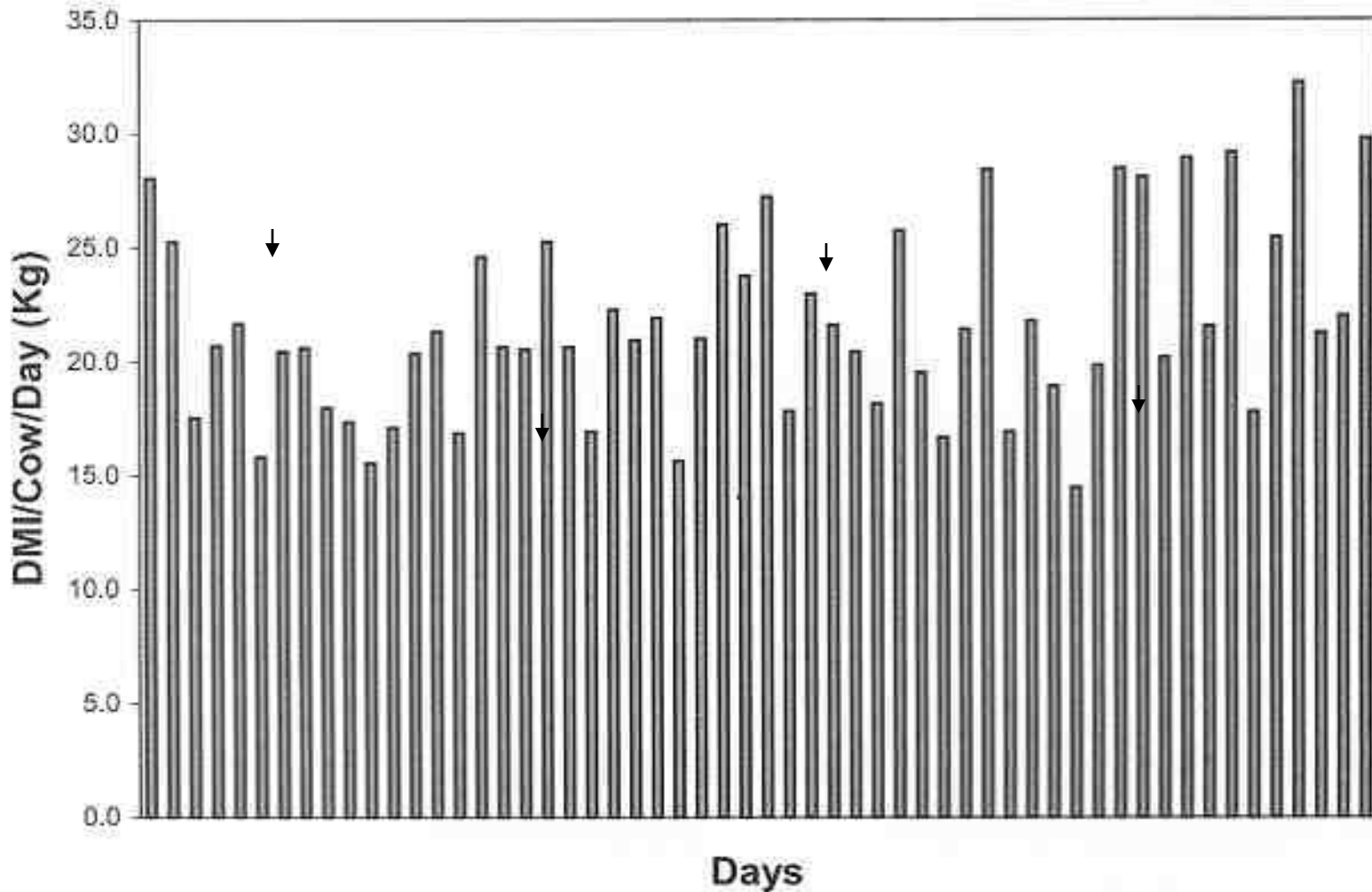
- Use PSPS on TMR offered, then at 8, 16, 24 h after feeding
  - <3-5% variation in particle size distribution
- peNDF = proportions retained on top 3 screens x NDF content of TMR

## If TMR is Too Fine

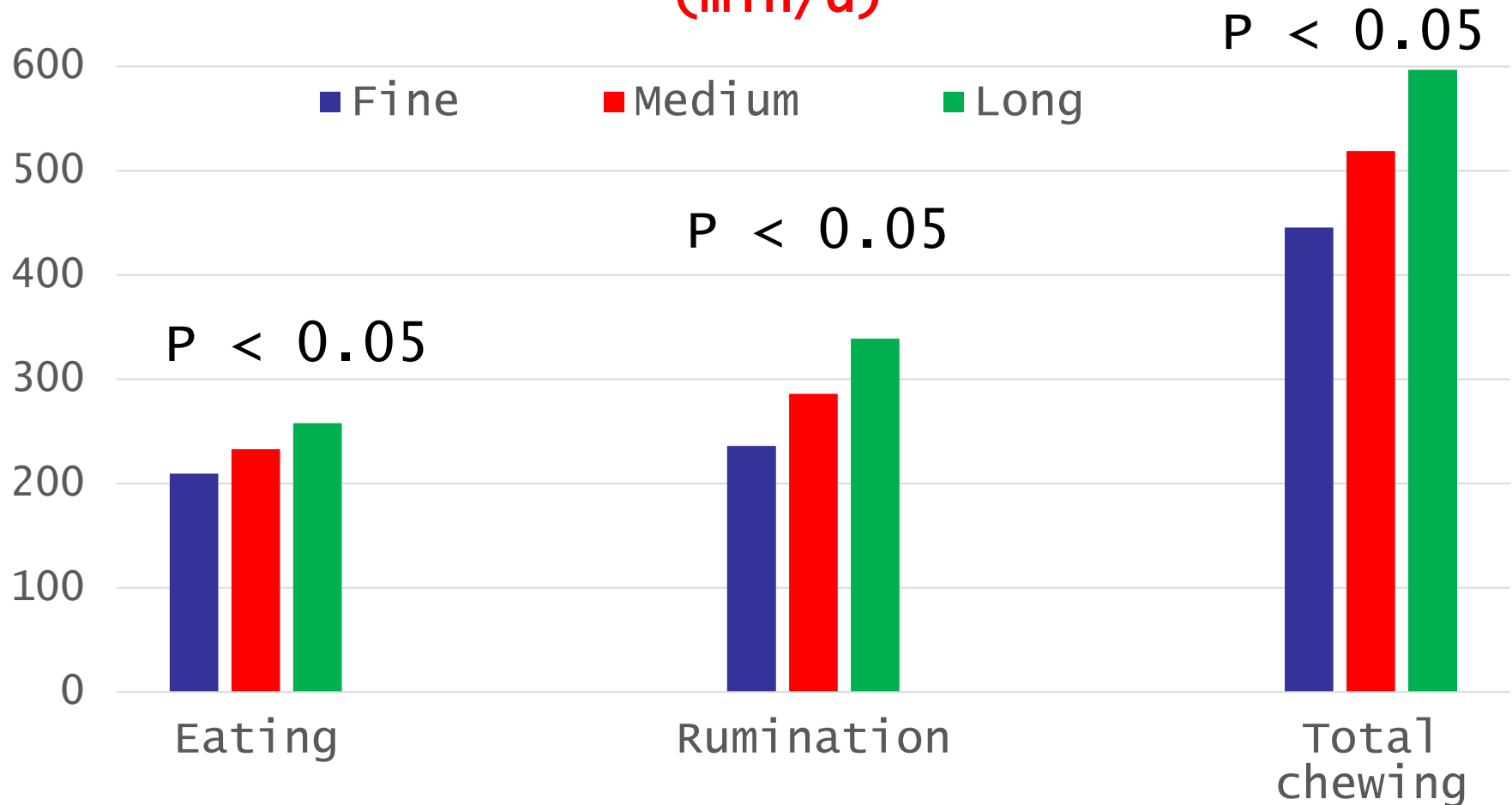
- Variable feed intakes
- Acidosis (loose manure)
- Lameness
- Reduced milk production
- Reduced milk fat content

# Variable Feed Intake

Variation in Dry Matter Intake per Cow per Day on Farm 9

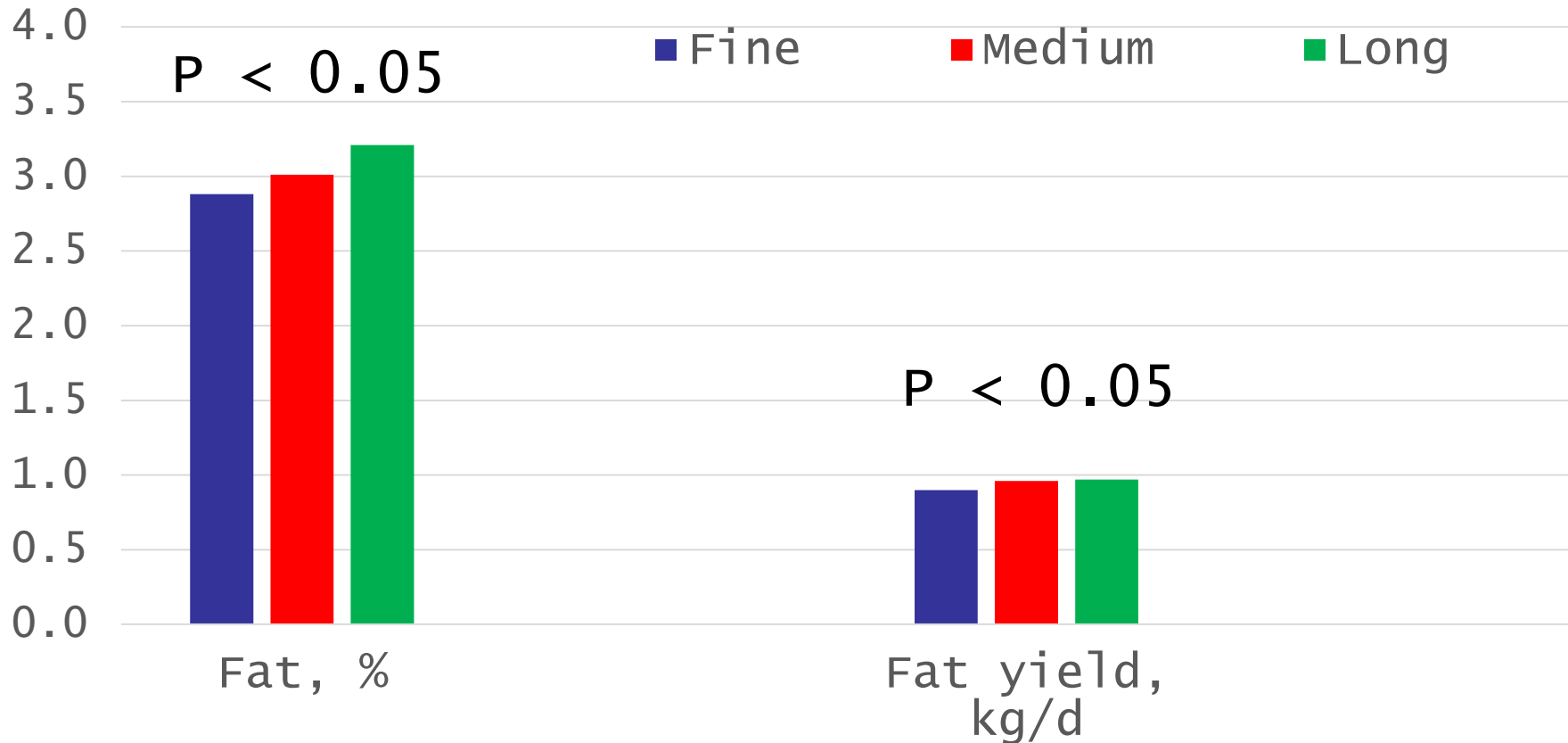


# Chewing Activity with Varying Alfalfa Particle Size (min/d)



- Particle size reduction reduces chewing, saliva production

## Milk Fat Responses to Varying Alfalfa Particle Size



- Particle size reduction reduces milk fat yield

# If TMR is Too Coarse

- **Cows sort TMR**
- Variable feed intakes
- Acidosis (loose manure)
- Lameness
- Reduced milk production
- Reduced milk fat content

## Take-Home Messages

- TMR particle size is important for production and animal health
- Checking TMR particle size on a regular basis is important
  - Forage chop length, mixing time, loading sequence of ingredients etc.
- Ration adjustments to meet peNDF recommendations can improve production and animal health