



# Welcome

## Vita Plus Dairy Summit 2013

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Goal: Consistent ration full length of the bunk



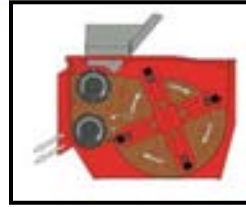
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## Mixer Basics



The Common TMR Mixers:

➤ Rotary / Reel Mixer



➤ Horizontal Auger



➤ Vertical Mixer



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## Choosing the Correct Type of TMR Mixer



### TMR MIXER ANALYSIS FOR PROPER MIXER CHOICE

DAIRY AND BEEF RATIONS

Mixer	Complete Rations					Ration Ingredients		
Mixer Type & Model	All haylage, corn silage, concentrates	Up to 20% dry hay, haylage, corn silage, concentrate	20%-40% dry hay, haylage, corn silage, concentrate	Over 50% dry hay, haylage, corn silage, concentrate	Haylage, haylage, corn silage, concentrate	Premixing of concentrates	Round bales (unprocessed)	Square bales (unprocessed)
4-Auger								
Reel								
Vertical								

\*Dry hay is good-quality alfalfa hay, both small or large square bales.  
This chart is a general guideline. Individual rations vary for every operation and will affect your mixer choice.



Best

Good

Not Recommended

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## Choosing the Right Size TMR Mixer



**When sizing a TMR mixer it is best to base it off of volume (cubic feet) and not lbs.**

**Normal Dairy Cow will consume 5 to 7 cubic foot of a TMR ration per day**

- All cut haylages, corn silage etc with no long stem hay a person can figure 5 cubic foot per day
- When using some long stem hay into the ration for rumen health (2-3 lbs) a person can figure 6 cubic foot per day
- When processing larger amounts of long stem hay, such as round bales in a vertical mixer a person can figure 7 cubic foot per day

**Using these numbers, take the max group or pen size you will be feeding, multiply it times the proper cubic feet and divide it by the number of times a day you plan on mixing and feeding**

**200 cows x 5 cubic feet per cow = 1,000 cubic feet**

**If feeding twice a day, divide by 2 = minimum 500 cubic foot mixer**

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## Now, What Configuration Best Fits My Needs?



### Trailer

- Detachable Power Unit
  - Multiple application
  - Adapted to farm use
- Variable speeds for discharge

### Truck

- Maneuverability
  - Long distances
  - Backing up
- Higher travel speeds

### Stationary

- Well suited for smaller operation with upright silos and pre-existing bunk feeding
- Can be economical and efficient for large operations
- Higher priced mixer does not get extra stress from travel
- Requires additional delivery machine





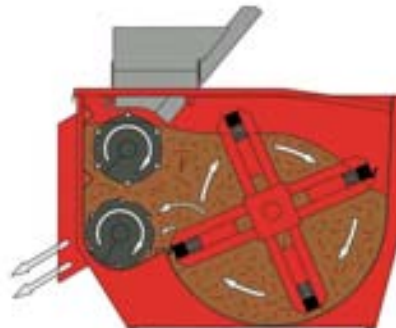
## Reel or Rotary Mixers



### How Does the Reel Auggie Work ?



- Large slow turning reel
- Gently lifts material into two blending augers
- Lower auger moves material forward
- Upper auger moves material rearward
- Faster, more thorough mix
- Fluffy, more palatable ration
- Lower auger serves as discharge auger



## Reel or Rotor Types



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## Lower Roughage Maxx Auger



- Incorporates up to 20% good quality unprocessed hay
- Bolt-on scallop knives are removable

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## Hay Maxx Long Stem Processing System



- Used to direct long stem hay through the rotating upper auger to break up larger slabs, wafers or chunks of long stem hay

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## Why should I use a Reel or Rotary Mixer?



### Advantages –

- Even unloading discharge
- Low horsepower requirement
- Low start up torque/HP (1.5X average running torque)
- Ability to mix up to 20% unprocessed long stem material
- Gentle on all ingredients
- High unloading height normally does not require power discharge

### Disadvantages –

- Limited in adding higher amounts of unprocessed roughages (long stemmed)
- Cannot handle whole round bales
- Can be overfilled (overfilling compromises consistency of mix quality)

### Applications –

- Many Dairy Rations
- Most beef finishing lots
- Mixing components for composting
  - Food waste
  - Industrial materials



## What sizes and types are available?



Sizes range from 150 to 950 cubic foot mixing capacity  
Most sizes offered in Stationary, Trailed and Truck Models



## Reel Video





## Horizontal Auger Mixers



### Horizontal Auger Mixers



End View



Side View

- The lower augers move feed forward while the upper augers move rearward
- The feed “convergence” area at the front of the mixer pushes feed upward into the upper augers – to then be moved to the rear of the mixer
- This creates a “front to back” and “up and down” cycling action within the mixer



## Roughage Maxx Option



Many roughage knife options available for handling higher amounts of long stem hay



## Why should I use a Horizontal Auger Mixer?



### Advantages –

- Even unloading discharge
- Low horsepower requirement
- Low start up torque/HP (1.5X average running torque)
- Ability to mix higher % of long fiber (up to 30%)
- Mixes very sticky material better than reel or vertical

### Disadvantages –

- Most expensive to manufacturer and sell
- The most moving parts of the mixer styles
- Cannot handle whole round bales
- More force and pressure used to mix the feed
- Lower discharge point commonly requires power discharge options

### Applications –

- Rations that have higher percentage of long fiber but the farmer still wants a lower horsepower machine with a very smooth discharge
- Rations that have a high amount of sticky material which is not mixed well in a reel or vertical



## What sizes and types are available?



Sizes range from 350 to 950 cubic foot mixing capacity  
Most sizes offered in Trailed or Truck Models



## Botec Video



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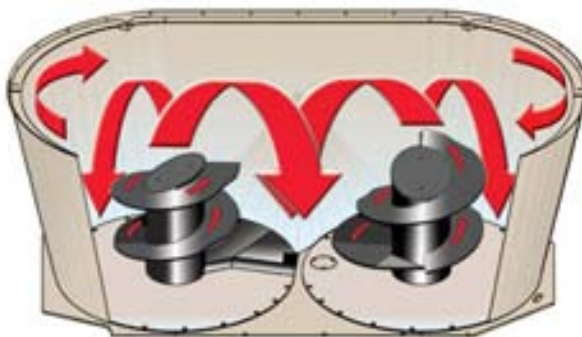
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## Vertical Mixers



### Vertical Mixers



- Mixing is done by one or two augers
- The augers pick up and elevate the material vertically, thus creating the “up and down” feed mixing cycle
- The rotation of the augers gives the “front to back” feed mixing cycle
- The “open” mixing chamber allows for 100% bale processing capabilities



## Single Auger vs Twin Auger



### Single Narrow Auger

- Smaller diameter; lower hp
- Tall loading height
- Fit larger bale without spilling
- Handles dry rations with little or no forages better

### Twin Auger

- Lower loading height
- Lower horsepower (start-up)
- Long and narrow
  - Fit best in older facilities with narrow alleys
- Tend to be more expensive with 2 planetary gearboxes
- Handles wetter roughages better



## Augers & Mixing Tub



- Augers gather material to the center and move it upward
- Hay stops slow movement around the tank for better processing and more upward feed movement
- Baffles in a twin auger keep the feed movement onto the augers and promotes feed movement between front and rear augers
- Hay retention or side extensions available



## Why should I use a Vertical Mixer?



### Advantages –

- Ability to mix the widest variety of materials
- Can process large amounts of hay, even full round bales, large square bales and baleage
- Simple drive system
- Available with several discharge options

### Disadvantages –

- Highest horsepower type of mixer – Can be up to 25% more Hp and fuel consumption vs. a Reel mixer
- Highest torque required for starting machine (2x average running torque)
- Will not mix rations with little or not roughage well. (premix)
- Uneven discharge

### Applications –

- Dairy
- Cow/ Calf Beef
- Any long fiber unprocessed forages
- Baleage / wet bales / dry bales



## What sizes and types are available?



Most sizes offered in Stationary, Trailed or Truck Models  
Ranging from 300 to 1800 cubic foot mixing capacity



## Vertical Mixer Video



## Power Comparisons of Mixers



- If a customer is going to process large amounts of dry hay square bales or any processing of baleage bales or round bales a vertical mixer is recommended.
- Test results show that a vertical mixer uses the least amount of horsepower processing these materials, however, the vertical mixers use dramatically more horsepower (+20-25%) than the Reel or 4-auger design for mixing after processing is completed.
- If minimal processing is required of long stem material (20% or under), the Reel or 4-auger mixer is the best choice because of mixing speed and horsepower requirement.

## Horsepower/Fuel Use Comparison Test



- **Mixing cost comparison using a similar size mixer assuming 3 hour of operation per day for one year with \$4.00 diesel fuel cost**
  - **Vertical - \$17,520**
  - **4- Auger - \$13,665**
    - **Less horsepower**
    - **\$3,855 annual savings**
  - **Reel - \$12,790**
    - **Less horsepower and mix time**
    - **\$4,730 annual savings**

## TMR Mixer Basics



### Mix Times:

- **Typically a good mix time is to have machine running at about  $\frac{3}{4}$  rated speed while loading and allow 3 to 5 minutes of mix time after the last ingredient is added. (this works if the mixer is not overloaded and has “normal” ration components)**
- **For processing bales through a vertical mixer – round bales can take 5 to 10 minutes to get broken down (no core left)**
  - **Depends on material being processed**
- **Big square bales can be just a couple of minutes – Always make sure the big “chunks” of hay are broken apart before adding other items**

## TMR Mixer General Loading Order



### Vertical

- Long Stem
- Water (if necessary)
- Corn silage
- Grains/dry premixes
- Wet Commodities
- Haylage
- Liquids

### Reel

- Long Stem
- Grains/dry premixes
- Corn silage
- Haylage
- Wet Commodities
- Liquids

### 4-Auger

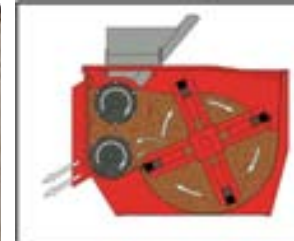
- Long Stem
- Grains/dry premixes
- Corn silage
- Haylage
- Wet Commodities
- Liquids



## Common Mistakes with Reel or Rotary Mixers



- Unprocessed long stem material being added too late in the ration or after the cut forages
- Not using a Hay Maxx system or roughage knives when adding higher amounts of un-processed long stem hay
- Attempting to load the mixer without bucket guards
- Overloading of the machine





## Reel or Rotary Mixer Maintenance Items



- Proper lubrication and maintenance
- Checking chain tension, alignment and grease lines inside of oil bath
- Replacing worn or damaged wipers
- Replacing worn or damaged knives
- Flighting and/or hopper wear



## Common Mistakes with Horizontal Auger Mixers



- Unprocessed long stem material being added late in the ration or after the cut forages
- Not using roughage knives when adding higher amounts of unprocessed long stem hay
- Overmixing



## Horizontal Auger Mixer Maintenance Items



- Proper lubrication and maintenance
  - ❖ Planetary
- Checking chain tension, alignment and grease lines inside of oil bath
- Replacing worn or damaged knives
- Flighting and/or hopper wear



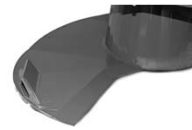
## Common Mistakes with Vertical Mixers



- Not allowing round or large square bales to process enough before adding other ingredients
- Leaving net wrap or twine on bales is an added detriment
- Too slow of auger RPMs – Need to be at rated PTO rpm and in High for processing
- Mixing time- undermixing vs overmixing
- Improper knife or Hay stop adjustment



## Vertical Mixer Maintenance Items



- Proper lubrication and maintenance
  - ❖ Planetary/Planetaries
- Replacing or sharpening worn knives
- Adjusting or replacing lead edge scraper
- Polishing up of tub and augers

## Electronic Scales



Several brands available but the two most common for the ag industry are **Digi Star & WeighTronix.**

- Make sure that you talk to your nutritional consultant and your dealer to understand what you expect your scale to do and what is available:
  - Programmable
  - Downloading
  - Wireless
  - Feed Management Software



## How Do These Scales Work?



### Bending Load Cells



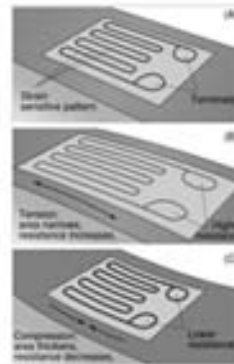
#### How a Load Cell Works:

A simplified explanation is that strain gauges measure movement of the steel in the load cell caused by a load.

This movement varies resistance with in the strain gauge.

Additional electronics at the load cell, junction box, and indicator provide a weight that matches the resistance and show changes in weight as the load on the load cell change.

The strain gauge was invented by Americans Edward Simmons and Arthur Ruge in 1938.



## How Do These Scales Work??



### Weighbars/Bending Bars



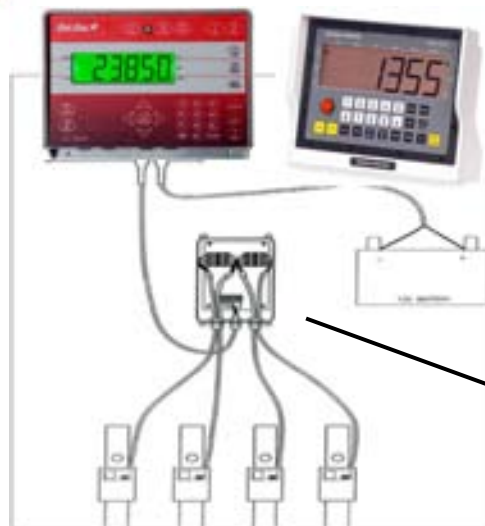
## How Do These Scales Work?



### Load Cell/Compression Type



## How Do These Scales Work?



Junction Box



## Common Electronic Scale Issues



- Calibration
  - New machine
  - New or replacement indicator
  - Matching mixer
- Warm-up drift
- Damaged bar, load cell or cord
  - Damaged can
  - Electrical- welding
  - Pinched or chewed cord
- Mechanical
  - Check arms
  - Crooked load cell
  - Binding

## Conclusion



**Your TMR Mixer is one of the most important management tools you have available to you for feeding dairy or livestock animals!**

It's up to you to:

- Choose the right type of mixer
- Choose the right size
- Choose the right configuration
- Use the mixer properly
- Inspect and Maintain the mixer
- Choose and Manage the scale system properly

**Let's get the most we can out of every ration!**



**Questions?**

